



This is a digital copy of a book that was preserved for generations on library shelves before it was carefully scanned by Google as part of a project to make the world's books discoverable online.

It has survived long enough for the copyright to expire and the book to enter the public domain. A public domain book is one that was never subject to copyright or whose legal copyright term has expired. Whether a book is in the public domain may vary country to country. Public domain books are our gateways to the past, representing a wealth of history, culture and knowledge that's often difficult to discover.

Marks, notations and other marginalia present in the original volume will appear in this file - a reminder of this book's long journey from the publisher to a library and finally to you.

Usage guidelines

Google is proud to partner with libraries to digitize public domain materials and make them widely accessible. Public domain books belong to the public and we are merely their custodians. Nevertheless, this work is expensive, so in order to keep providing this resource, we have taken steps to prevent abuse by commercial parties, including placing technical restrictions on automated querying.

We also ask that you:

- + *Make non-commercial use of the files* We designed Google Book Search for use by individuals, and we request that you use these files for personal, non-commercial purposes.
- + *Refrain from automated querying* Do not send automated queries of any sort to Google's system: If you are conducting research on machine translation, optical character recognition or other areas where access to a large amount of text is helpful, please contact us. We encourage the use of public domain materials for these purposes and may be able to help.
- + *Maintain attribution* The Google "watermark" you see on each file is essential for informing people about this project and helping them find additional materials through Google Book Search. Please do not remove it.
- + *Keep it legal* Whatever your use, remember that you are responsible for ensuring that what you are doing is legal. Do not assume that just because we believe a book is in the public domain for users in the United States, that the work is also in the public domain for users in other countries. Whether a book is still in copyright varies from country to country, and we can't offer guidance on whether any specific use of any specific book is allowed. Please do not assume that a book's appearance in Google Book Search means it can be used in any manner anywhere in the world. Copyright infringement liability can be quite severe.

About Google Book Search

Google's mission is to organize the world's information and to make it universally accessible and useful. Google Book Search helps readers discover the world's books while helping authors and publishers reach new audiences. You can search through the full text of this book on the web at <http://books.google.com/>





Average Mileage Delivered Last Year—14,000 Miles

That's the record of the Hood Extra Ply Tire, size 30" x 3½". What other make of tire can point to such a performance with its resulting low cost per mile?

For the purpose of comparison, consider a so-called "standard" tire of the same size listing at \$20.85—recently adjusted on a basis of 3,500 miles—and which may deliver, let us say, 4,500 miles. Figured on a cost-per-mile basis, this ordinary tire shows an actual and final cost of \$4.63 for each 1000 miles run.

Figured on the same basis, a Hood—listing at \$31—shows a final cost of only \$2.21½ for each 1000 miles. The difference, which is \$2.41½, proves that in running 14,000 miles on Hoods the user saves \$33.81 for each Hood Tire.

Put on a Hood to-day
Forget it for a year



You can buy
HOOD TIRES
at this sign




And remember also that—one tube only is required during the life of a Hood, while the "low-mileage" make will require at least three tubes to cover an equal distance. At \$4 each, your extra tube expense is \$8.

\$33.81 plus \$8 is \$41.81—what you save in running 14,000 miles if your tire is a Hood. Can you afford to be without a Hood?

Ask the Hood Dealer for proof. And write to us for free booklet, "The Why of the Extra Ply."

HOOD TIRE CO., Inc.
WATERTOWN MASS.

11 Spark Plug Facts



Do you realize what these eleven potent facts represent to the users of Red Head Spark Plugs and the thousands of dealers who serve them?

- | | |
|-----------------------|------------------------|
| 1- Corporation | 6- Assembly |
| 2- Policy | 7- Quality |
| 3- Engineering | 8- Sizes |
| 4- Improvement | 9- Service |
| 5- Manufacture | 10- Sales helps |
| 11- Deliveries | |

Sold wherever Motor Vehicles are used

The Red Head Spark Plug Corporation
261 Broadway New York City



**REO**

Speed Is Economy

WE USED TO THINK that big units in loads spelled economy.

BUT WE HAVE FOUND differently. We know that the Motor Truck that delivers each load in the shortest space of time is the most economical in the long run.

IN EIGHTY PER CENT OF CASES the commodity to be transported averages less than a ton in weight.

THAT BEING TRUE, it stands to reason that the cheapest way is to deliver each load separately, instead of carrying several tons over the first part of a long route in order to deliver fractions of the load to various points.

THIS REO "SPEED WAGON"—the pioneer and still the leader of its type—has revolutionized our ideas on hauling.

IT HAS DONE MORE—it has revolutionized design in motor trucks by proving that speed is the greatest factor in achieving economy.

MOUNTED ON PNEUMATICS it is capable of any speed the law allows—and with full load.

ELECTRICALLY STARTED it conserves the time, as well as the energy of both driver and truck.

ELECTRIC LIGHTS permit speed with safety at night.

THESE THREE FEATURES first incorporated in a motor truck by Reo, have changed all standards of hauling, have speeded up business in a thousand lines and made this Reo "Speed Wagon" known as the world's most efficient, most economical and most dependable motor truck ever built.

Reo Motor Car Company
Lansing, Michigan

"The Gold Standard of Values"

(When Writing to Advertisers, Please Mention the Automobile Journal.)

TRADE MARK
EAGLEINE
 REGISTERED
**MOTOR
 OILS**



EAGLEINE OILS

are unequalled for motor lubrication, freer from carbon, economical because they protect the motor against mechanical wear, and the quantity required is comparatively small.

These are the claims of thousands of motorists,—some with years of experience, who want full value, and more who know the value of high grade lubricants, and who know when they obtain satisfaction.

EAGLEINE QUALITY IS INSURED TO YOU

A grade for every type of motor. It is sold in sealed containers.

*Let us send you our new book and chart.
 It is free at request.*

EAGLE OIL AND SUPPLY CO.
 44-45-46 India Street, Boston, Mass.

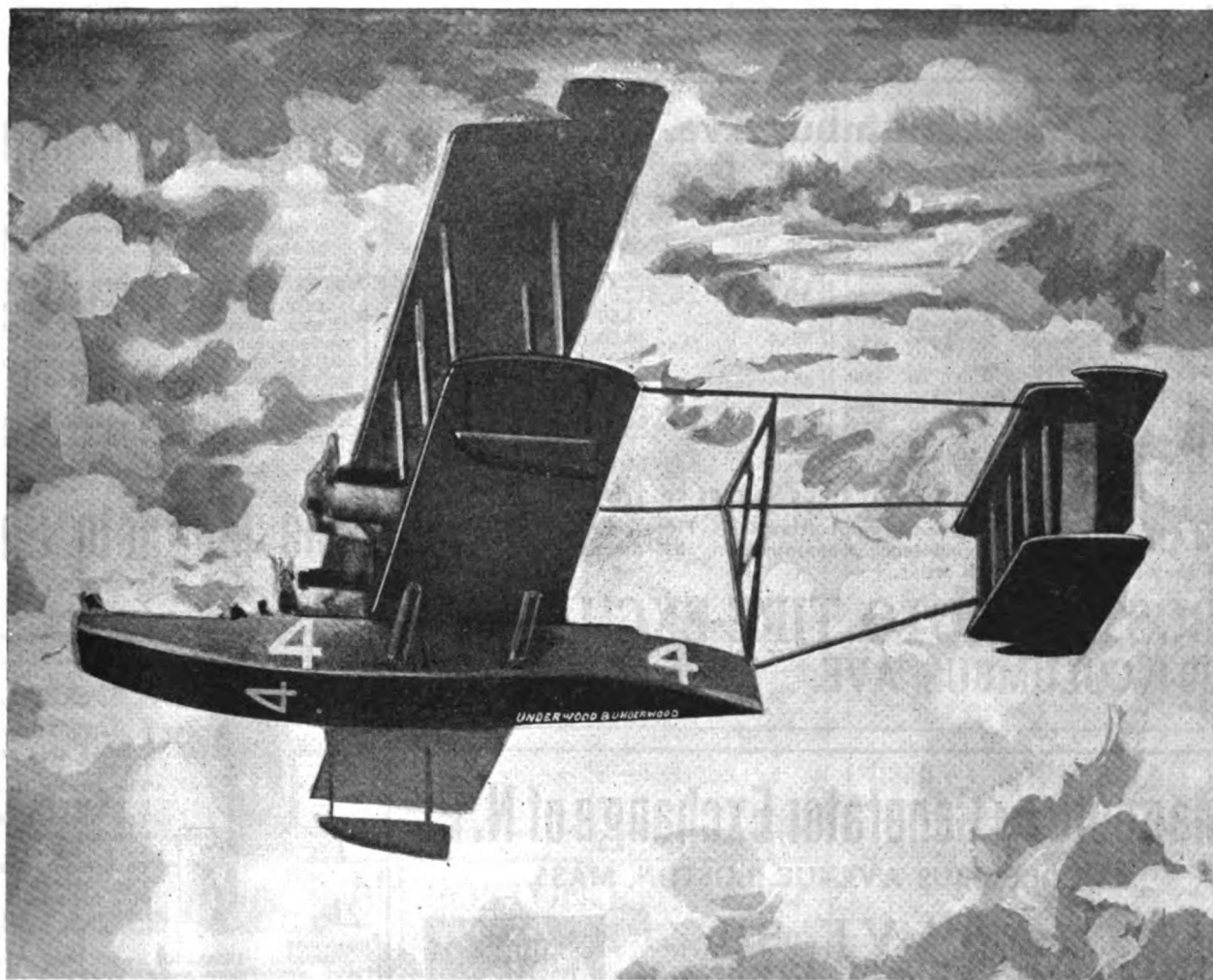
NEW YORK CITY
 Woolworth Building

CHICAGO
 1132 W. 37th Street

AUTOMOBILE JOURNAL

INDEX TO ADVERTISERS

	Page
Affa Specialty Co.....	4
Atlas Tire Co.....	44-45
Atwater Kent Sales Co. of N. E.....	5
Barrett Co., The.....	35
Barrett Motor Starter Manufacturing Co., Inc.....	42
Boston Auto Tire Exchange.....	4
Boston Retread Tire Co.....	5
Bowring & Co.....	5
Brightman Auto Exchange.....	5
Broadway Tire Jobbers Co.....	5
Brown Spring Oiler Co.....	6
Cambria Tire Exchange.....	5
Coes Wrench Co.....	48
Connecticut Auto Parts Co., Inc.....	5
Culver-Stearns Manufacturing Co.....	45
Dixon Crucible Co., Joseph.....	48
Eagle Oil and Supply Co.....	2
Empire Hotel.....	38
Flaherty, Wm. H.....	4
Grant Motor Car Co.....	46
Gulf Refining Co.....	3
Hargrave Hotel.....	38
Heiser Special Tool Co.....	42
Hood Tire Co.....	Cover
Hotel Empire.....	38
Hotel Wellington.....	45
Liben, M. & Co.....	4
Liberty Tire Co.....	5
Magneto Exchange and Repair Shop.....	5
Magneto and Generator Exchange of N. E.....	4
Magneto Shop.....	4
Metz Sales Corporation.....	42
Mitchell & Smith, Inc.....	46
Motalarm Corporation, The.....	43
National Can Co.....	46
New Departure Manufacturing Co.....	48
New York and New Jersey Lubricant Co.....	47
Nielson Co., V. A.....	47
Pulge-Detroit Motor Car Co.....	45
Panvar Co.....	41
Pierce-Arrow Motor Car Co.....	Cover
Pressman Tire Co.....	39
Red Head Spark Plug Co.....	Cover
Reo Motor Car Co.....	1
Standard Oil Co. of N. Y.....	Cover
Strandway Auto Parts Co.....	5
Wellington Hotel.....	45
Zenith Carburetor Co.....	42



There is *MORE POWER* in
THAT GOOD GULF GASOLINE
and **SUPREME AUTO OIL**

Manufactured by **GULF REFINING COMPANY, Pittsburgh, Pa.**

EFFICIENT, perfect and constant lubrication was the greatest factor in the ultimate success of the adventurous trip of the NC-4. Hence the Navy left nothing to chance. Grilling, practical tests, scientific investigation, exhaustive research, were all combined against the possibility

of disastrous engine troubles resulting from poor lubrication.

The choice of GULF LIBERTY AERO OIL, therefore, was made with a positive knowledge that it would fulfill every requirement, and the success of the NC-4 has proven the wisdom of the choice.

SUPPLIED BY
GULF REFINING COMPANY

Manufacturers of SUPREME AUTO OIL and THAT GOOD GULF GASOLINE

(When Writing to Advertisers, Please Mention the Automobile Journal.)

TRADE OUTLET

At 304
**Columbus Ave.
For K-E-E-P-S**
304

Selling Slightly Used Tires. The Largest Stock in the East. "Your Money's Worth or We Make Good." Remember Our Prices Will Interest You.

Size	Tires	Size	Tires
30x3	\$4.50 down to \$2.40	33x4 1/2	\$12.00 down to \$6.00
30x3 1/2	6.50 down to 3.40	33x5	14.50 down to 8.00
32x3 1/2	8.75 down to 3.90	35x4	10.50 down to 9.00
31x4	8.00 down to 4.00	34x4 1/2	10.00 down to 6.00
32x4	8.25 down to 5.00	35x4 1/2	12.00 down to 6.50
33x4	9.00 down to 5.50	36x4 1/2	12.00 down to 6.00
34x4	10.75 down to 6.00	35x5	25.00 down to 6.90
32x4 1/2	12.00 down to 7.00	36x5	12.00 down to 8.00
		37x5	14.00 down to 6.00

USED TUBES, ALL SIZES, AT \$1.50 TO \$2

MAIL ORDERS given prompt attention. Tires sent C. O. D. with privilege of examination. 5% discount if cash or money order comes with order.

BOSTON AUTO TIRE EXCHANGE
304 COLUMBUS AVE. TEL. B. B. 7329

Magneto and Generator Exchange of N. E.

44 COLUMBUS AVENUE, BOSTON, MASS.

SAVE 50%

Offers

Quality Service for your car.

Starting, Lighting, Ignition.

One year guarantee on repairs and installations of all makes.

Everything pertaining to Auto, Electricity, Magneto and Generator Parts. We have one of the best equipped shops in New England devoted exclusively to this work.

BOSCH, SPLITDORF, EISEMANN, DIXIE, BERLING MAGNETOS
and Parts Always in Stock.



Magneto Repairs

Skillfully Done. Assured Satisfaction. Prompt Service.

The repair work turned out of this shop is of the highest merit—because I know how. If you have electrical and magneto troubles, no matter whether it is a

BOSCH, SPLITDORF-EISEMANN, or any other make, I can fix them. My well-appointed plant, coupled with skilled workmen, assures you of expert magneto service. Send in your magneto. 24-hour shipment.

Rebuilt Magnetos, Platinum Parts, Generator Brushes, Bearings, Etc.

Correspondence Invited.

The Magneto Shop

JOHN BRUNSWICK,
187 Massachusetts Ave., Boston, Mass.



SPECIALTIES for the Ford

They stop the rattle in—

The Brake Rod Supports for 35c.
The Brake Rod Clevises for 50c.

The Spark and Throttle Rods for 25c.
The Steering Spindles for 50c.

They serve many other useful purposes and are

inexpensive. **JOBBERS, DEALERS**, write for prices and folder which mean money for you.
Affa Specialty Co., 34-D Southbridge St., Worcester, Mass.



BOSTON'S Finest Equipped Auto Electric Repair Service

With a staff of trained electrical men we can offer auto owners expert service, coupled with promptness and personal attention to all electrical repair problems. We also repair any electrical equipment used on a motor car. Official service and parts representative for

AUTO-LITE LIGHTING AND STARTING SYSTEMS.
Complete Stock of
GENUINE PARTS.

All Work and Parts Guaranteed.

William H. Flaherty Co.

74 CUMMINGTON ST., BOSTON, MASS.

Tires Guaranteed 5000 Miles

30x3 plain.....\$10.00
Non-Skid.....\$10.50
30x3 1/2 plain.....\$13.50
Non-Skid.....\$15.00
Big saving on other sizes and tubes also. Trade in your old tires. 20% deposit required on C. O. D. orders.

Write for lists to

M. Liben & Co.

793 J 7th Ave., New York City.

Every Ford Owner Should Read "TRANSFORMING THE FORD." Tells how to secure smooth, positive brake action that no car can excel. A little "transforming" and your car will glide to a quiet, quick stop without the annoying, irritating clatter that you now experience. It will go into low or reverse without jumping or jerking and you can pick up speed with all the smoothness and ease of a high-priced car. All accomplished without additional expense and the result is a clear saving of 75 per cent. in one direction alone. "TRANSFORMING THE FORD" tells how it's done. Send for your copy this very minute. IT IS FREE. **Cormack & Co., 560 Fifth Ave., New York City.**

Auto Mailing Lists

Send for our free complete Price List covering Auto Dealers, Owners, Ford Dealers, Truck Dealers and Owners, Garages, Auto Mfrs. and etc., any state. **A. F. WILLIAMS, Mgr. of List Dept.**
168 W. Adams St., Chicago. Franklin 1182.

(When Writing to Advertisers, Please Mention the Automobile Journal.)

TRADE OUTLET

TIRES

JOB LOTS

Obsolete, Surplus Stocks and
Factory Seconds

WRITE—CALL

BROADWAY TIRE JOBBERS

250 West 54th Street

New York

AUTO SAVE 50-90% FOR 400 CARS PARTS

POPE, PACKARDS, PIERCE, BUICK,
STEVENS-DURYEA, KNOX, OVER-
LAND, ETC.

Motors	\$25.00 up	Presto Tanks . . .	\$ 4.50 up
Magnetos	4.00 "	New Spotlights . .	2.00 "
Carburetors . . .	3.00 "	Generators	10.00 "
Rear Axles	15.00 "	Coils	1.00 "
Front Axles . . .	5.00 "	Bearings	1.00 "
Cylinders	5.00 "	Radiators	10.00 "

\$12 Diamond Bumpers \$5.50

Jobbers in Bankrupt Auto Supplies.

BRIGHTMAN AUTO EXCHANGE

84 Wooster St., Hartford, Conn.

AUTO PARTS.

50% to 90% OF List.

24 Hour Service. Unlimited Stock.
Pope-Hartford, Columbia, Reo,
Overland and 200 other makes.

Motors, \$20.00 up | E. Presto Tanks, \$4.00
Magnetos, \$3.50 up | B. Presto Tanks, \$4.75
Cylinders, \$3.00 up | Bearings, 50c up
Springs, \$1.00 up | Rims, \$1.00 up

1000 Other PARTS Bargains.

If you want any part not listed here.
Write Us—We Have It.

Conn. Auto Parts Co., Inc.

1070 Main St., Hartford, Conn.

Atwater-Kent Sales Co., of New England

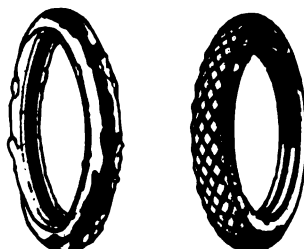
883 BOYLSTON ST., BOSTON, MASS.

Official
SALES AND SERVICE
For New England.

Complete stock of parts always
on hand.

Write for Price List.

BOSTON RETREAD TIRE CO.



Before

After

OUR METHOD OF RETREADING IS
DIFFERENT FROM OTHERS.

We use all Goodyear first quality stock
and retread bands and can absolutely
guarantee from

3000 to 3500 Miles.

We will replace a new tire for every
one that our work does not give satis-
faction.

Tires called for and delivered. We pay
express charges one way on all out-of-
town orders.

Price List Mailed Upon Request.

BOSTON RETREAD TIRE CO.

70 Clarendon St., Boston, Mass.

H. Gordon, Ltd., 8a City Road,
London, are open to take up
the **SOLE AGENCY** of
leading American
Firms for

**Light Motor Cars and Access-
ories, Motor-Cycles and Ac-
cessories, Leather Belting.**

References: Messrs. Bowring & Co.,
Battery Place, New York City.

We Are Exclusive
SELLING AGENTS
for the N. F. G.
CARLISLE CORD TIRE.
Dealers write for our special propo-
sition.
CAMBRIA TIRE EXCHANGE.
204 Columbus Ave., Boston, Mass.

TIRES AND TUBES

Demonstrating and Factory Repaired.

Economy, Qual-
ity, Price. All
Standard
Makes.

Size	Tires	Tubes
30x3	\$5.00	\$1.35
30x3 1/2	6.00	1.45
32x3 1/2	6.50	1.50
31x4	7.25	1.65
32x4	8.00	1.80
33x4	8.75	1.70
34x4	8.75	1.70



No Junk. Satis-
faction Guar-
anteed.

Size	Tires	Tubes
36x4	\$9.00	\$1.75
34x4 1/2	9.25	1.75
35x4 1/2	9.50	1.80
36x4 1/2	9.75	1.85
35x5	10.50	2.00
37x5	11.00	2.20

write for Prices on Odd Sized Tires. **TERMS:**
\$1.00 deposit with each tire ordered, balance C.
O. D. subject to inspection. Specify style of
rim to avoid delay. Although used tires are not
guaranteed for any definite number of miles,
we guarantee our tires to give the best
service in proportion to the prices paid, or rea-
sonable adjustments are made.

**LIBERTY TIRE CO., 2119 So. Michigan
Ave., Dept. I, Chicago, Ill.**

EXPERT REPAIRING: every known
Magnet and Ignition System, Starters
Motors, Generators, Magneto Exchange
and Repair Shop, 269 Halsey Street,
Newark, N. J.

**FORD OWNERS—Buy a safe T first
Rubber High Class Coil Box Protector
—only \$2.00. Save \$20.00 damages on a
rainy day. Big profits for agents, job-
bers and dealers.**

**SAFE T FIRST GASKET CO.,
316 West 134th St., New York City.**

AUTO PARTS—At Your Own Prices.
We can supply parts for nearly every
make of car. 648 Packards, Interstate
Fours, also Truck parts, GMC and
other makes.

Write us for Parts. We have them.

**STRANDWAY AUTO PARTS CO.,
193-195 H. St., South Boston, Mass.**

(When Writing to Advertisers, Please Mention the Automobile Journal.)

*Do your springs squeak?
Does your car ride badly?
Does your car show undue wear?
What about upkeep and repair bills?*

A squeaking spring is a constant menace. It is proof that they are dry and rusty. That soon the leaves will become frozen and then must break.

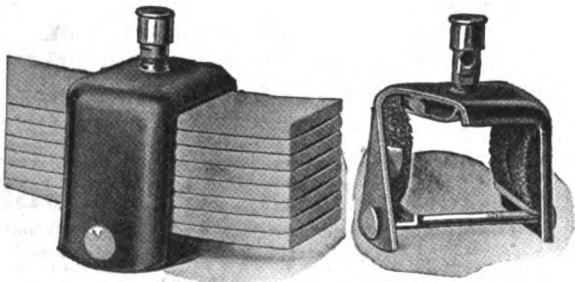
Safety, car service and comfort depends on the condition of the springs on any vehicle; yet no part of the car is given so little attention.

Springs must be lubricated if they are to absorb all road shocks and stresses. Otherwise they break and oftentimes with fatal results. Cars with dry and rusty springs deteriorate quickly and all the mechanism soon shows the effects of the sledge hammer blows that the springs, if properly lubricated, would absorb.

Springs a Potent Factor In Car Operation

BROWN SPRING OILERS

Will stop all spring squeaks. They will lubricate all bearing surfaces and the springs will not break. The car will ride easily and all undue wear on tires, chassis and body will be eliminated.



The illustration shows how the Brown Spring Oilers are made. How easy to attach. How and why it is so positive in action. It is made to slip over the spring and once placed it is bolted in position, filled with oil and requires no further attention aside from refilling the oil well. There is a size for every spring. It will last for years. It is a car necessity and an ever earning investment. It saves and always serves. The cost is moderate. It is car insurance of the highest quality.

Spring manufacturers recommend them. All jobbers and dealers sell them. They are sold with an iron-clad guarantee of complete satisfaction in any service.

At request we will send a copy of the most interesting books on springs and care of the car ever written. It tells as well how to add to tire mileage and how to cut upkeep and repair costs to the minimum.

Complete information at request. Write for it today.

Brown Spring Oiler Company
6913 CARNEGIE AVENUE, CLEVELAND, OHIO

AUTOMOBILE JOURNAL

INDEX TO CONTENTS

Published Monthly by the
AUTOMOBILE JOURNAL PUB. CO.
Times Building, Pawtucket, R. I.

WILLIAM H. BLACK.....Treasurer
DAVID O. BLACK.....Secretary

Branch Offices: New York City, Chicago, Detroit,
Boston, St. Louis, Cleveland.

SUBSCRIPTIONS:

United States and Mexico (Postage Paid) the year \$1.50
Canada\$2.50
Foreign Countries in Poston Union.....\$3.50
The Copy.....20 Cents

PARTIAL LIST OF CONTENTS

	Page
Touring New York State.....	7
The Onondaga Trail.....	8
New York State Maps.....	9
The Iroquois Trail.....	10
Maps of Cities in New York State.....	11
Good Roads to New York Resorts.....	12
U. S. Now Has Highway Weather Service.....	13
Ford Awarded Nominal Damages.....	14
Gruesome Lessons for Speeders.....	15
N. A. C. C. Committees Appointed.....	16
Automobile Tour to Gettysburg.....	17
Many 1920 Cars Are Announced.....	18
Photographs of New Cars.....	19
Gleanings from the Auto World.....	21
License Plates in Various States.....	22
Automobile Registration Fees.....	23
Personals of Industry and Trade.....	25
Ford Engine Power Devices.....	26
Mechanical Suggestions.....	27
Accessories' Department.....	28
Features for the Woman Motorist.....	33
Automobile Associations.....	34
Automobile Dealers' Associations.....	37

(When Writing to Advertisers, Please Mention the Automobile Journal.)

New York Ideal State For Automobile Touring

Three-Score Counties Offer to Motorists Thousands of Miles of Splendid Roads.

THROUGHOUT the length and breadth of her three-score counties, New York offers to the tourist thousands of miles of splendid state and county roads, radiating like the spokes of a wheel from a hundred centers, and constantly increasing in number and extent. Hotels there are and inns by the score which for luxury and comfort, for excellence of cuisine and of hospitality cannot be surpassed the world over.

The majesty of the lordly Hudson, with its many historic associations; the Catskills, where linger boyhood memories of Rip Van Winkle; the Berkshires, which lie opposite, to the east of the Hudson valley, and the thrilling Adirondacks all beckon welcomingly to the motorist.

On the eastern flank are Lakes George and Champlain, two wonderful bodies of the bluest waters, dotted with islands and indented by daring points and capes. Then there is the Mohawk Valley, which divides the Empire state into two very nearly equal parts. Farther south and farther west the country is broken up into long, narrow valleys, by a series of elongated lakes, running north and south, to which has been given the name, "Finger Lakes."

Along the northern boundary of the state glows the mighty St. Lawrence, which fights its way out of Lake Ontario through devious channels among the entrancing Thousand Islands. From Cape Vincent to beyond Alexandria Bay the noble river is cut into ribbons by the myriad green isles of this unique archipelago.

Further west Lake Ontario glistens in



Durham Falls, Durham, N. Y.

the cool sunlight. Along the southern tier, from Jamestown to Binghamton, macadam roads connect one prosperous city with the next. In Niagara Falls New York counts herself supreme.

New York City itself is the supreme attraction. Purchased from the Indians 300 years ago for \$24, the city, comprising the boroughs of Manhattan, Brooklyn, the Bronx, Queens and Richmond, is the wonder of the modern world. First in population, wealth and commerce, it is a stirring example of the energy and ingenuity of the 20th century America.

Niagara Falls has a wonderful appeal. It is situated on the east bank of the Niagara river, about midway between Lake Erie and Lake Ontario. The waters from four of the great lakes pour over the rocks at this point. Every facility is offered the tourist for visiting the falls. Two cities, one on the Canadian and one on the American side, are well supplied with hotel and garage accommodations. The falls are divided by Goat Island into the Canadian or Horseshoe Falls, 158 feet, and the American Falls, 167 feet.

Albany, the capital of New York state, was called by the Indians, "Shaunaghtoda," the Pine Plains or Beyond the Pines. The derived name, Schenectady, was afterwards given to the hamlet at the other end of the pine plains.

Ashokan dam or reservoir, where is impounded the water supply of the great metropolis 90 miles to the south, is one of the greatest feats of engineering ever accomplished, and in magnitude it ranks with the Panama Canal. Its construction has necessitated the abandonment of 11 miles of railroad, 64 miles of highway, 7 villages, 32 cemeteries.



A Shady Drive, Stevensville, N. Y.

THE ONONDAGA TRAIL

GOOD roads and splendid scenery make the Onondaga trail one that is a real pleasure for the motorist to follow. Places crowded with historical interest are traversed, and there is always something of interest to guard against any monotony. Following the course of the Hudson river, the first part of the trail extends from New York to Poughkeepsie.

Yonkers, Dobbs Ferry and Tarrytown, which played such important roles in the Revolutionary War, lie in the path. Another point of unusual interest is Ossining, where Sing Sing state prison is located.

At Poughkeepsie the motorist sees many charming estates and at Albany there is also much to see, that attracting the greatest interest being the state capitol.

The capitol, at the top of Slate Hill, was built at a cost of some \$25,000,000. It took 30 years to construct this building. Bret Harte was born in Albany in 1839. This section was first visited about 1540 by French fur traders.

After Henry Hudson's arrival in the "Half Moon" in 1609, a Dutch trading post named Fort Nassau was built on Castle Island. This having been wrecked by a flood, the Dutch West India company sent out a settlement of 30 families, who built Fort Orange on the mainland, where Albany now stands. When the settlement passed finally into English possession, in 1674, it was called Albany.

Less than 15 miles from Albany is Schenectady, where Union College warrants a visit. After passing through Ilion the tourist reaches Utica, situated in a charming section of the Mohawk valley. Syracuse, the next city visited, is the biggest city in Central New York and is the home of Syracuse University.

Continuing toward Buffalo, the trail extends through Camillus, Sennett and Auburn, where the Auburn state prison for women is located. From Canandaigua the tour runs northwest through Mendon and Pittsford into Rochester. Forty miles from Rochester is the historic city of Batavia.

Approaching Buffalo the tourist passes the County Club House of the Automobile Club of Buffalo, the second city of New York state. From Buffalo the road is through East Aurora and other places of interest until Elmira is reached. A state road from Elmira follows the valleys of the Chemung and Susquehanna rivers to Binghamton.

From Binghamton there is a state road to Oneonta, on the north bank of the Susquehanna, the principal gateway to the Catskills from the west, and the motorist now passes into the mountains. At Grand Gorge the trail turns south along the

east branch of the Delaware through Roxbury to Margaretville, where it joins the southern trunk line through the mountains.

From Margaretville the tour proceeds to Ashokan dam and reservoir, which supplies water to New York City, 90 miles away. Next Kingston is visited. Small towns mark the continuation of the trail until Highland is reached, this being the half-way point on the route and directly across the river from Poughkeepsie. A cantilever bridge, 1¼ miles long, spanning the Hudson, connects the two towns.

The trail continues to Newburgh, thence to Tuxedo and Suffern, and at Nyack there is a ferry crossing into Tarrytown, bringing the motorist to the east shore and the conclusion of the tour.

The itinerary is as follows:

ONONDAGA TRAIL

New York-Poughkeepsie.

Miles		Miles	
New York.....	0.0	Harmon.....	32.7
Yonkers.....	14.4	Croton.....	33.8
Hast-on-Hud.....	17.9	Peekskill.....	41.5
Dobbs Ferry.....	18.9	Fishkill Village.....	60.9
Irrington.....	21.4	Wapeters Falls.....	66.0
Tarrytown.....	24.1	Poughkeepsie.....	73.7
Ossing.....	30.0		

Poughkeepsie-Albany.

Miles		Miles	
Poughkeepsie.....	0.0	Blue Stores.....	30.8
Hyde Park.....	6.2	Livingston.....	34.0
Staatsburg.....	10.2	Hudson.....	42.3
Rhinebeck.....	16.3	Stockport.....	48.2
Red Hook.....	21.7	Stuyvesant Falls.....	51.7
Up. Red Hook.....	24.4	Kinderhook.....	54.9
Nevia.....	27.6	Valatie.....	56.0
Clermont.....	28.9	E. Greenbush.....	54.9
(Adirondack Trail Starts Here.)			
Rensselaer.....	74.4	Albany.....	75.3

Albany-Utica.

Miles		Miles	
Albany.....	0.0	Nelliston.....	56.0
Schenectady.....	14.9	St. Johnsville.....	61.9
Scotia.....	16.5	Little Falls.....	72.2
Amsterdam.....	30.8	Herkimer.....	79.3
Fort Johnson.....	33.7	Mohawk.....	80.9
Tribes Hill.....	36.1	Ilion.....	82.5
Fonda.....	41.5	Frankfort.....	85.0
Palatine Bridge.....	53.1	Utica.....	94.6

Utica-Syracuse.

Miles		Miles	
Utica.....	0.0	Chittenango.....	34.0
New Hartford.....	3.0	Mycenae.....	37.3
Vernon.....	16.5	Manlius Center.....	41.3
Oneida Castle.....	21.7	East Syracuse.....	45.1
Wampsville.....	24.9	Syracuse.....	45.9
Canastota.....	27.3		

Syracuse-Rochester.

Miles		Miles	
Syracuse.....	0.0	Flint.....	57.9
Camillus.....	8.3	Hopewell.....	60.0
Elbridge.....	15.3	Canandaigua.....	67.4
Sennett.....	20.4	Victor.....	77.6
Auburn.....	25.4	Mendon.....	83.0
Seneca Falls.....	40.1	Pittsford.....	89.6
Waterloo.....	43.5	Rochester.....	97.2
Geneva.....	51.6		

Rochester-Buffalo.

Miles		Miles	
Rochester.....	0.0	Patavia.....	37.3
Scottsville.....	12.4	East Pembroke.....	43.4
Garbutt.....	14.7	Pembroke.....	50.3
Mumford.....	18.9	Clarence.....	58.3
Caladonia.....	20.2	Williamsville.....	66.2
LeRoy.....	27.3	Snyder.....	68.3
Stafford.....	31.4	Buffalo.....	75.9

Buffalo-Dansville.

Miles		Miles	
Buffalo.....	0.0	Rock Glen.....	47.0
Ebenezer.....	7.9	Silver Springs.....	51.1
E. Aurora.....	17.5	Castile.....	54.9
Varysburg.....	32.8	Portageville.....	59.9
Orangeville.....	36.4	Hunts.....	64.4
Halls Corners.....	39.1	Canaseraga.....	78.4
Warsaw.....	42.3	Dansville.....	88.9

Dansville-Elmira.

Miles		Miles	
Dansville.....	0.0	Campbell.....	41.5
Wayland.....	6.3	Coopers.....	46.3
Cohocton.....	14.7	Painted Post.....	49.3
Avoca.....	22.4	Corning.....	51.8
Kanona.....	26.8	Big Flats.....	58.7
Bath.....	30.6	Elmira Hts.....	65.3
Savona.....	37.0	Elmira.....	70.6

Elmira-Binghamton.

Miles		Miles	
Elmira.....	0.0	Owego.....	36.2
Lowman.....	6.5	Apalachin.....	43.3
Chemung.....	12.4	Vestal.....	49.5
Waverly.....	17.1	Union.....	50.3
Barton.....	23.8	Endicott.....	52.4
Smithboro.....	26.5	Johnson City.....	54.0
Tioga Center.....	30.5	Binghamton.....	58.6

Binghamton-Oneonta.

Miles		Miles	
Binghamton.....	0.0	Bainbridge.....	33.2
Port Crane.....	7.3	Sidney.....	39.4
Sanitaria Spgs.....	10.9	Unadilla.....	43.8
Belden.....	16.8	Wells Bridge.....	49.3
Harpurville.....	20.3	Otego.....	53.6
Nineveh.....	22.1	Oneonta.....	61.8
Afton.....	27.4		

Oneonta-Kingston.

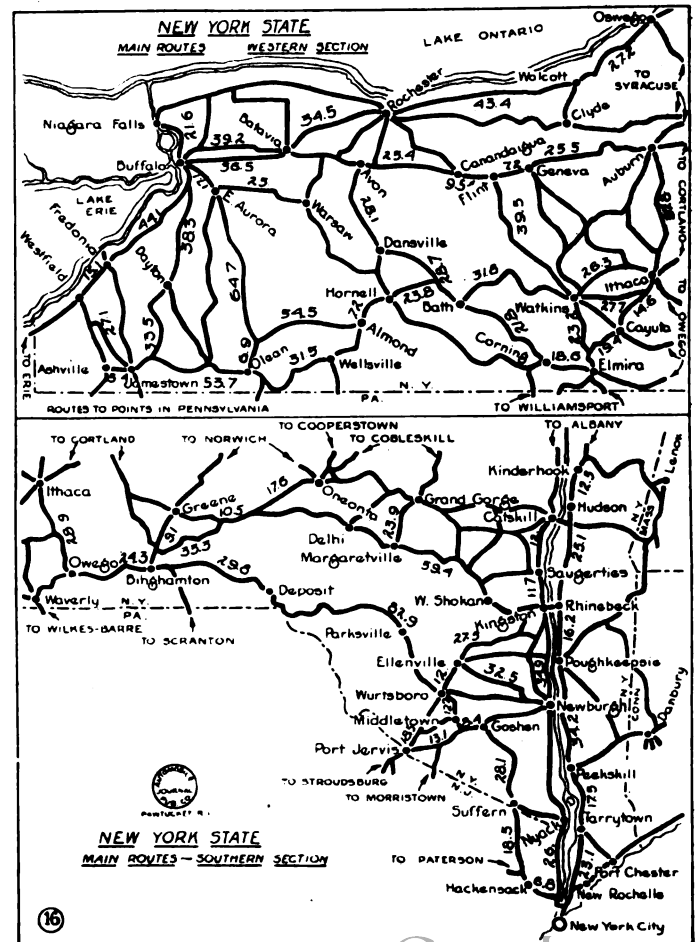
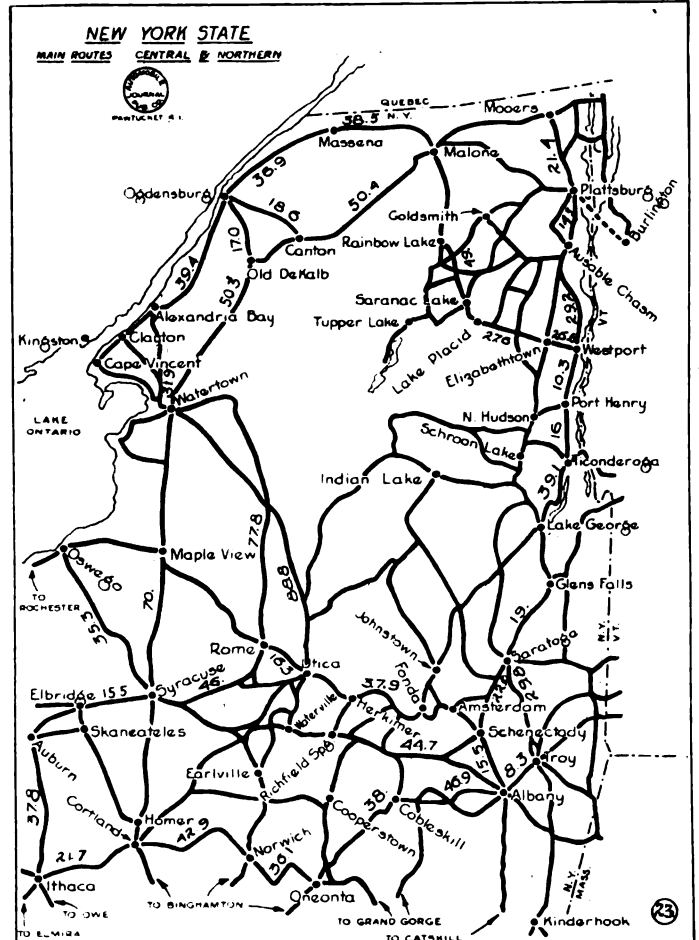
Miles		Miles	
Oneonta.....	0.0	Highmont.....	62.8
Davenport Gen.....	8.6	Pine Hill.....	64.9
Davenport.....	13.0	Shandaken.....	69.8
Harpersfield.....	22.5	Allagen.....	71.4
Stamford.....	27.0	Phoenicia.....	75.7
Grand Gorge.....	35.0	Mt. Pleasant.....	79.5
Roxbury.....	42.4	Boleeville.....	83.0
Halcotaville.....	48.6	Shokan.....	86.9
Kelley Cors.....	50.5	Ashokan.....	87.8
Margaretville.....	54.2	West Hurley.....	94.2
Arkville.....	55.7	Kingston.....	101.6
Fleischmanns.....	60.6		

Kingston-Newburgh.

Miles		Miles	
Kingston.....	0.0	Highland.....	16.9
Rondout.....	2.4	Milton.....	21.3
Port Ewen.....	8.2	Marlboro.....	26.3
Winter Park.....	6.6	Middle Hope.....	29.0
Exopus.....	9.0	Newburgh.....	33.3

Newburgh-New York.

Miles		Miles	
Newburgh.....	0.0	Ramsey.....	37.3
Vails Gate.....	4.8	Allendale.....	39.1
Woodbury.....	12.2	Hohokus.....	41.5
Highland Mills.....	18.9	Arcola.....	47.6
Central Valley.....	15.1	Hasbrouck Hts.....	52.8
Harriman Sta.....	17.0	Rutherford.....	55.4
Southfields.....	22.0	W. Arlington.....	59.8
Tuxedo.....	26.1	Newark.....	63.7
Sloatsburg.....	28.8	Jersey City.....	69.1
Suffern.....	32.9	New York.....	74.9
Mahwah.....	34.6		



THE IROQUOIS TRAIL

STARTING at Erie, in the northwest-ernmost corner of Pennsylvania, the Iroquois trail leads into New York state and skirts Lakes Erie and Ontario, taking the tourist up through the Adirondack mountains, thence down to Albany and returning through the Mohawk Valley to the starting point at Erie.

The road leaving Erie follows the shore of the lake through small towns into Westfield, N. Y., where the grape belt of Chautauqua county begins. The trail leads to Buffalo and then north to Niagara Falls. The next place of importance is Rochester.

Just north of Lockport the road joins the Ridge road and follows the general line of that old highway, which is now state macadam. From Rochester there are delightful drives to Irondequoit Bay, Manitou Beach, Nine-Mile Point and Ontario Beach.

The road to Syracuse runs almost parallel with the shore line of Lake Ontario through Williamson, Wolcott and Sterling Center, then turning south to Syracuse. After proceeding east for a short distance, the motorist strikes north to Cicero, a small village to the west of Oneida Lake. From there the state road runs directly north through small towns to Adams, where the road turns toward the lake again and follows the shore through Henderson Harbor and Sacketts Harbor.

The trail now turns inland for Watertown, one of the principal gateways to the Adirondacks and the starting point for tours to the Thousand Islands and at the St. Lawrence river. From Watertown the state road follows the bank of the St. Lawrence through Alexandria Bay and Morristown into Ogdensburg, where there is a ferry connection to Prescott on the Ontario side of the river.

From Ogdensburg the road continues east to Canton, thence northeast through Potsdam into Malone. The road to Plattsburg follows a rather arbitrary line through numerous small villages. At Mooers is a junction where connections may be made with the King Edward Highway for Montreal. Following the shore of Lake Champlain the road winds around past the famous Ausable Chasm into Keeseville, where the Adirondacks proper begin.

At Keene the Adirondacks trail is crossed and a little south is Elizabethtown, a village at the junction of two valleys. South from Westport the road runs close to the lake. Crown Point and Ticonderoga are passed, and the motorist comes to Lake George, following its shores through summer resorts to Saratoga Springs.

The trail continues south to Ballston Spa and over the rolling country into Schenectady, thence to Albany. The state road is followed to Cooperstown, East Berne and Berne, summer resorts



Katrina Falls, Near Monticello, N. Y.

in the Heldeberg mountains being passed. At Colliersville the tourist strikes the north and south trunk line and proceeds northward through Milford into Cooperstown. At Ithaca the country surrounding is beautiful. Lake Cayuga stretches out for 42 miles in a beautiful expanse of water, 381 feet above sea level. Many waterfalls tumble down the gorges nearby, the largest being Ithaca Falls, second in size only to Niagara.

After going to Watkins, Hammondsport is reached. Bath, Cuba, Olean and Salamanca lie in the trail. From Jamestown the course follows the shore of Lake Chautauqua through Mayville. At Westfield the tourist turns east for Buffalo and west for Erie.

ITINERARY.

Erie, Pa.-Buffalo, N. Y.

Miles	
Erie	0.0
Harbour Creek	8.2
Moorheadville	11.0
North East, Pa.	15.2
Ripley, N. Y.	22.7
Forsyth	26.3
Westfield	30.5
Portland	37.4
Brocton	38.9
Lamberton	41.7
Fredonia	45.6
Sheridan	51.5
Silver Creek	57.3
Irving	60.7
Farnham	62.7
Brant	66.6
Angola	70.2
Evans	71.7
Jerusalem Corn.	73.8
Wanakah	80.9
Lake View	82.6
Athol Springs	83.8
Bay View	84.8
Woodl'n Beach	86.1
Buffalo	93.0

Buffalo-Niagara.

Miles	
Buffalo	0.0
St. Johnsbury	16.2
Niagara Falls	26.4

Niagara Falls-Rochester.

Miles	
Niagara Falls	0.0
Pekin	13.6
Cambria	20.6
Albion	57.3
Holly	66.9
Brockport	72.0

Wright's Corn.	26.8	Clarkson	73.1
Ridge Rd. Vil.	29.5	Garland	75.0
Hartland	33.3	Parma	80.0
Johnson Creek	36.1	W. Greece	81.9
Jeddo	39.5	Greece	84.9
Ridgeway	42.8	Uptonville Sta.	88.2
Medina	46.5	Rochester	91.4

Rochester-Syracuse.

Miles		Miles	
Rochester	0.0	Wolcott	45.1
W. Webster	8.0	Red Creek	50.9
Webster	11.3	Fairhaven	54.1
Fruitland	16.1	Sterling Center	59.4
Ontario Center	17.7	Hannibal	63.1
Ontario	19.0	Granby Center	68.8
Williamson	24.0	Fulton	71.9
E. Williamson	26.5	Phoenix	80.8
Sodus	30.8	Three River Pt.	83.0
Wallington	33.5	Liverpool	91.1
Alton	35.3	Syracuse	96.0

Syracuse-Watertown.

Miles		Miles	
Syracuse	0.0	Mannsville	47.5
Cicero	9.4	Pierrepont Man.	49.1
Brewerton P. O.	13.8	Adams	54.9
Hastings Center	19.3	Roberts Corn.	60.2
Hastings P. O.	23.2	Henderson	64.4
Colosse	26.5	Henderson Har.	66.6
Maple View	29.1	Sacketts Harbor	75.1
Pulaski	36.8	Watertown	85.5
Sandy Creek	42.5		

Watertown-Ogdensburg.

Miles		Miles	
Watertown	0.0	Oakvale	45.2
Pamella	8.7	Hammond	49.0
Theresa	18.6	Briarhill	55.3
Pleasant	24.3	Morristown	59.5
Alexandria Bay	30.3	Ogdensburg	70.5
Redwood	37.3		

Ogdensburg-Malone.

Miles		Miles	
Ogdensburg	0.0	Lawrenceville	52.2
Canton	18.5	Moir	57.7
Potsdam	29.3	Brushton	59.9
Hopkinton	43.6	N. Bangor	65.5
Nicholville	45.9	Malone	70.8

Malone-Plattsburg.

Miles		Miles	
Malone	0.0	Mooers	39.8
Burke	7.3	Sciota	44.8
Chateaugay	12.3	W. Chazy	50.6
Ellenburg Cen.	25.0	Beekmantown	54.2
Ell'burg Depot	27.7	E. Beek'town	56.1
Mooers Forks	36.7	Plattsburg	60.7

Plattsburg-Elizabethtown.

Miles		Miles	
Plattsburg	0.0	Jay	32.6
Ausable Chasm	13.2	Upper Jay	36.2
Keeseville	15.3	Keene	42.3
Clintonville	21.2	Elizabethtown	54.4
Ausable Forks	26.7		

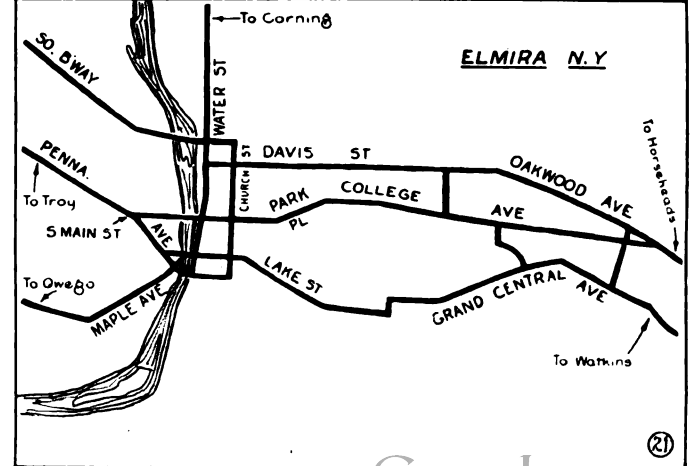
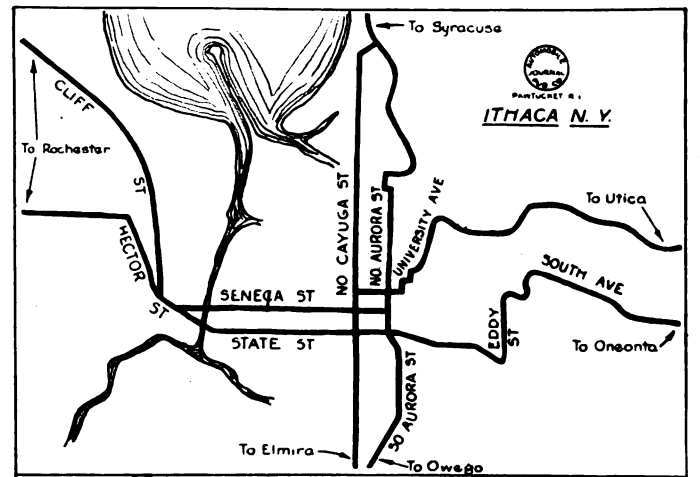
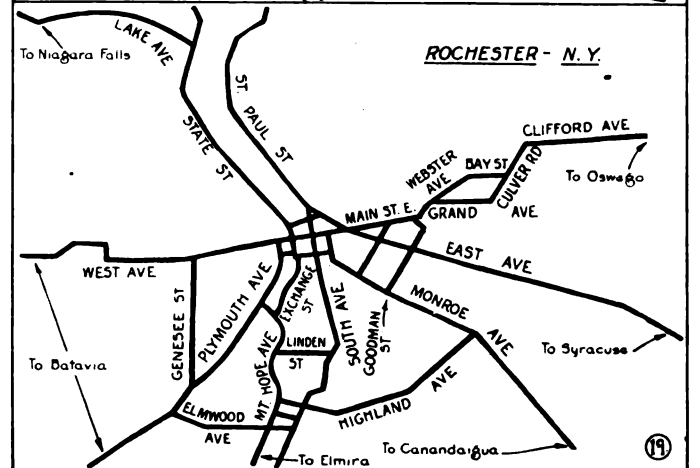
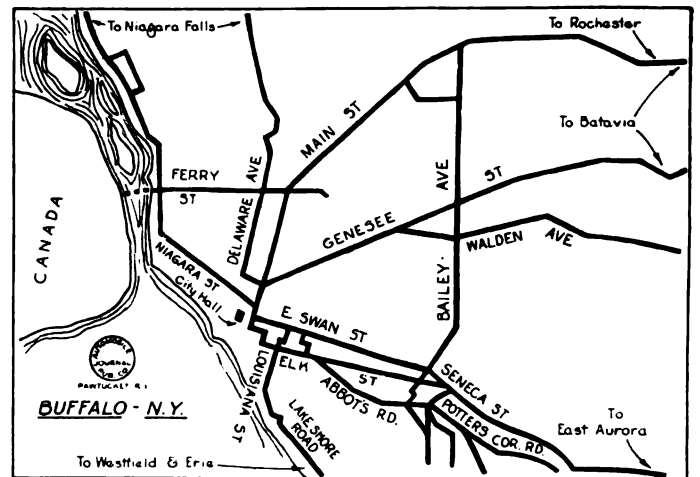
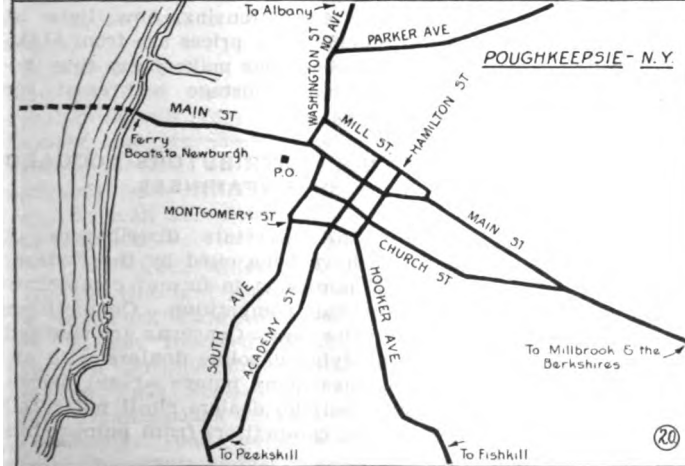
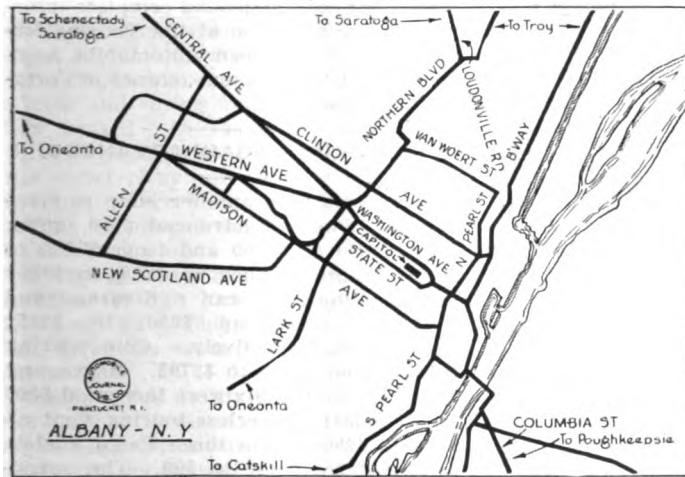
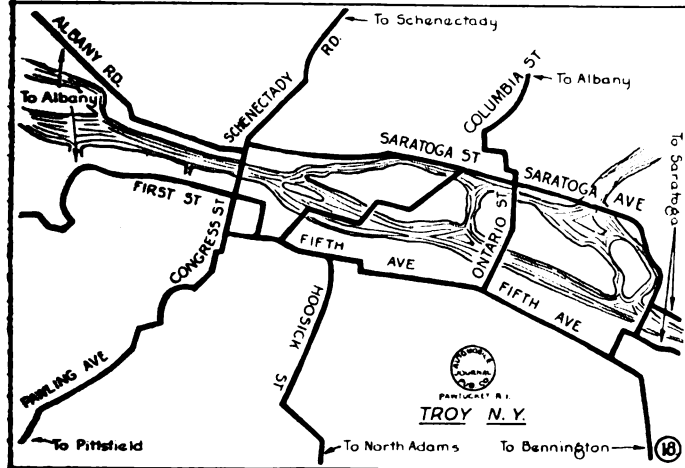
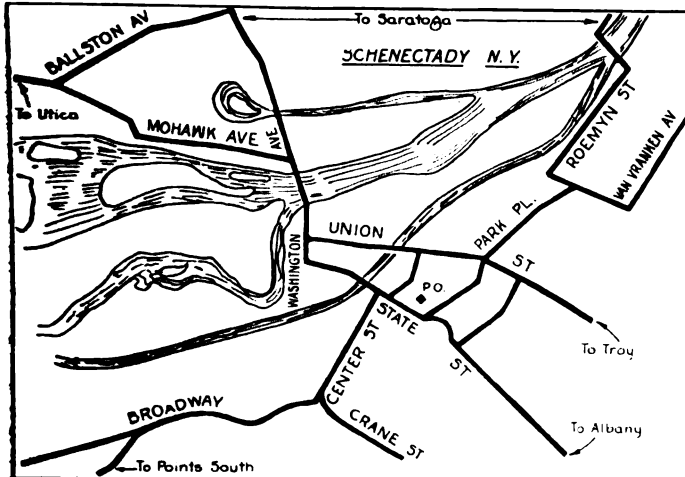
Elizabethtown-Saratoga.

Miles		Miles	
Elizabethtown	0.0	Bolton	51.8
Westport	9.1	Marion-on-Lake	54.2
End of road	18.9	George	55.9
Port Henry	19.2	Diamond Point	59.8
Fork	19.5	Lake George	71.8
Crown Point	26.5	Luzerne	77.4
Ticonderoga	35.1	S. Corinth	81.5
Hague	44.1	Greenfield Cen.	86.3
Silver Bay	47.8	Saratoga Spgs.	91.6
Sabbath Day Pt.	49.9		
Bt. Ld. for Bol'n	50.0		

Saratoga-Albany.

Miles		Miles	
Saratoga Spgs.	0.0	Scotia	21.8
Ballston Spa	6.8	Schenectady	23.2
Ballston Lake	13.6	Woodlawn	26.6
Burnt Hills	14.6	Albany	38.4

(Continued on Page 12.)



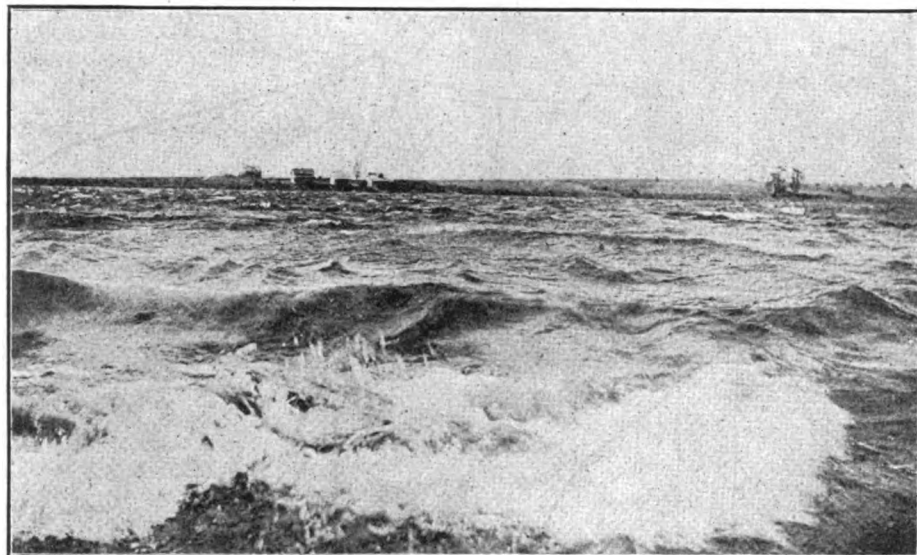
(Continued from Page 10.)

Albany-Cooperstown.

Miles	Miles
Albany	0.0
Delmar	5.4
Clarksville	13.5
E. Berne	21.2
Berne	25.0
W. Berne	27.8
Gallupville	31.7
Vrooman's Cor.	35.6
Central Bridge	39.0
Cobleskill	47.3
Warnerville	49.1
Richmondville	52.8
E. Worcester	59.8
Worcester	64.5
Schenevus	69.8
Maryland	73.2
Cooper's'n June	78.6
Colliersville	79.7
Portlandville	83.4
Millford	87.9
Cooperstown	96.2

Cooperstown-Watkins.

Miles	Miles
Cooperstown	0.0
Fly Creek	5.5
Oakville	6.7
Burlington	13.2
W. Burlington	17.0
Edmeston	20.0
Sherburne	33.8
Smayna	38.1
Bonney	43.8
Otselle	46.7
De Ruyter	57.3
Truxton	65.7
Cortland	76.8
Dryden	86.9
Ithaca	98.7
Newfield	106.4
Alpine	116.0
Odessa	120.0
Montour Falls	123.0
Watkins	126.2



Crystal Lake, Albany County, New York.

Watkins-Hornell.

Miles	Miles
Watkins	0.0
Tyrone	9.9
Brudford	14.6
Sonora	18.8
Savona	23.3
Bath	29.6
Kanona	33.4
Howard	42.3
Hornell	53.6

Hornell-Jamestown.

Miles	Miles
Hornell	0.0
Almond	5.3
Alfred Station	9.1
Andover	17.8
Wellsville	26.6
Scio	31.4
Belmont	36.3
Belvidere	39.4
Friendship	44.0
Cuba	51.7
Hinsdale	60.2
Olean	67.0
Alleghany	71.0
Vandalia	75.9
Carrollton	79.9
Salamanca	86.9
Red House	92.7
Steamburg	98.2
Randolph	104.7
Kennedy	112.1
Falconer	118.5
Jamestown	121.2

Jamestown-Westfield.

Miles	Miles
Jamestown	0.0
Fluvanna	4.0
Remus Point	7.9
Bay View	9.2
Dewittville	14.3
Hartfield	17.0
Mayville	19.0
Westfield	25.3

A four-cylinder model will be the first car made by the DuPont Motor Manufacturing Corporation, Philadelphia, of which E. Paul duPont is president.

Summary of Roads To Reach Resorts In New York

FOR motorists planning up-state trips in New York, the Touring Bureau of the American Automobile Association has compiled a summary of the best ways to reach some of the more important resort places.

New York state's popularity with automobilists constantly increases as they become better acquainted with the excellence and continuity of its state highway system. No other region offers such long and uninterrupted stretches of good state macadam.

The Catskills—Are best reached at the present time via the east side of the Hudson through Poughkeepsie to Rhinebeck, then across the ferry to Kingston, running along the north side of the Ashokan reservoir to Phoenicia, Highmount, Fleischmanns and Stamford. Be-

along the Mohawk river from Albany through Schenectady, Amsterdam and Fonda to Little Falls. Here turn right and run through Fairfield, Middleville and Poland to Barneveld. The reason for this route in preference to continuing along the route to Herkimer and Deerfield to Utica is that the road between Little Falls and Herkimer is under construction, necessitating a long but good detour through Fairfield and Middleville. Repair work is in progress on the trunk line from Utica to Watertown via Boonville and Lowville, though the road has not been closed and is passable with careful driving.

Central and Western New York—The best and most direct route between New York and Buffalo is via the so-called Liberty highway through Tuxedo, Goshen, Middletown, Monticello, Liberty and Roscoe to Binghamton. From this point continue along the Delaware river through Oswego to Elmira, then north through Watkins to Geneva, where connection is made with the main east and west trunk line, which runs through Canandaigua, Caledonia and Batavia to Buffalo. The somewhat longer but better known route through Poughkeepsie, Albany, Utica and Syracuse is also good with the exception of the detour between Little Falls and Herkimer. Motorists going to points west of Buffalo are advised to ship their cars by boat to either Cleveland or Detroit, according to their ultimate destination. If bound for Chicago it is best to ship to Detroit, thereby avoiding several very poor stretches of road, notably just before reaching Erie and also between Cleveland and Toledo.

Detailed road maps and complete information are available at the Touring Bureau of the American Automobile Association, 501 Fifth avenue, corner of Forty-second street.

CAR PRICES AGAIN ADVANCED.

Many cars took another jump in price Aug. 1. Packard advanced \$400, going from \$4800 to \$5200 and from \$5150 to \$5550. Stutz climbed up \$250, to \$3100 for its touring car. Stearns and Standard went up \$250, to \$2750 and \$3000 respectively. Cole touring leaped from \$2595 to \$2795. Hayes and Stephens Sallent Six were increased \$200 on all models. Peerless touring went up \$140 to \$2900. The three Paige models advanced from \$40 to \$90. The seven-passenger Case touring now lists at \$2200. Velie's new prices are from \$1685 to \$2385. Some car makers say they believe the car shortage will exist for three years.

GASOLINE DISTRIBUTORS ACCUSED OF UNFAIRNESS.

Thirty-one interstate distributors of gasoline have been cited by the Federal Trade Commission in formal complaints alleging unfair competition. Competitors initiated the case. Concerns are charged with supplying gasoline dealers with automatic measuring pumps at cut prices, on condition the dealers shall not retail gasoline of competitors from pumps thus furnished.

U. S. HAS HIGHWAY WEATHER SERVICE

BY APPROVAL of the secretary of agriculture of a suggestion made by its chief, Charles F. Marvin, a new activity has been added to the work of the weather bureau. It is to be known as the highway weather service.

Every automobile tourist will rejoice at this. The service is for him and for the encouragement of cross country transportation of freight in motor trucks. It will have to do with making reports on the condition of roads from day to day, as well as probabilities of sunshine or storm along them.

Tried out with success in a few states, the service is to be operated throughout the country on lines similar to forecasting weather. Road information and the weather prediction will be given on the same card.

This means that an automobilist can consult the weather bureau card or call up a local branch and ascertain what kind of "going" is ahead of him on his intended route, or can get that information in the postoffices of the villages en route where the cards for the day are always on view. Benefit of such information and the ease with which it may be had will be appreciated by every man who has tried to find out road conditions from local information.

Beginning of Service.

This information will have to do at first with the most important highways and in most inclement seasons for the particular region. In New York state, Pennsylvania, New Jersey, Ohio and western states where there has been request for it the service will be given for main roads from early fall, through the winter and spring until all fear of snow has passed. In the South where the through roads are of dirt the season of the worst rains will be covered, and in sections where such roads abound and storms are more frequent it will be practically continuous.

So far 12 states and the District of Columbia, through local highways authorities or automobile associations, have asked for the main roads and bad season service.

Conspicuous by its absence from the list is New England, from whose states no request has come, owing, it is surmised, to the limited use of automobiles in that section in the time of heavy snows.

It was not until a demand for a daily road condition report had come to the weather bureau from many parts of the country that Mr. Marvin made his proposal to the head of the Agricultural Department. He had the indorsement of the American Association of State Highway Officials.

Local Observers.

One of the first requests came from the New York State Automobile Association. It was followed by those of the American Automobile Association and the New York State Motor Federation. These organizations stressed the need of government road reports like the weather forecast announcements to cover

Will Inform Autoists About Condition of Roads



the highway between Albany and Buffalo, with as much extension of service as could be given, particularly in bad weather.

At the meeting of the State Highway Officials in Washington in May Mr. Marvin said that if requests for this information became extensive the bureau would have to depend largely on reports sent by local unpaid observers by mail. These observers, he said, could be authorized in special cases to add a word or two to the regular weather telegrams, and they would receive franks to use, as all tolls and expenses would be paid by the government.

Salaries could not be paid as the question would be raised as to whether making road reports was a part of the weather bureau function.

Commissioner Coleman of Virginia was in favor of the service, but said that while some states had good main roads his state's roads were in poor condition, and reports to be of value there would have to cover all its roads.

Daily Reports.

Mr. Marvin thought they would in time. He believed the bureau was equipped to give the service. The policy would be to solicit a daily voluntary report from reliable men at different points along the roads, just as the weather bureau does now in different parts of the country as to weather conditions. There are 5000 unpaid weather observers giving this service to the government every day. They are supplied with instruments

and expenses are refunded.

There would be no trouble in getting an equally efficient corps of road condition observers on like terms.

All the additional expense would be the pay of a few extra men at the bureau offices to handle the business. Col. Uhler, who had charge of War Department overland traffic by motor trucks from Pittsburgh to Harrisburg winter before last, clinched the matter when he said:

"Our patrolmen wired the Pittsburgh weather bureau branch of the condition of the road, and on the strength of that and the forecast given by the branch we kept all of our roads open during the winter."

The State Highways Association then passed this resolution: "We approve the work of the weather bureau in collecting and sending out information regarding the condition of the roads of the country, and request the several state highway departments to assist the bureau in collecting the required data."

Outline Method Sheet.

These things caused Secretary Houston to ask Mr. Marvin how he proposed to furnish this road information service after he had his local reports. The reply was an outline method sheet, the nature of which is indicated by these extracts for New York and neighboring states.

New York—Headquarters at Buffalo, Rochester, Syracuse and Albany. Projects—Automobile and motor truck routes from Buffalo and Albany. Methods—Telephones to automobile and motor truck associations and all interested parties condition of roads as reported, and notice of the approach of heavy storms.

New Jersey—Headquarters, Trenton. Project—State highways of state methods. Furnish information to designated officials throughout the state by telephones and telegraph and maps and bulletins; give warnings of storms.

Pennsylvania—Headquarters, Philadelphia. Project—Roads between Pittsburgh and Harrisburg. Methods—Receive daily report from along Lincoln Highway; bulletin and furnish same to newspapers and all interested. Issue warnings of heavy snows in mountains of Western Pennsylvania and wire same to state superintendent of highways at Harrisburg and for information of traffic.

Other states which will receive this new road condition service because they have requested it are Ohio, Michigan, Wisconsin, North Dakota and California. It is already in practise in Arkansas, with headquarters at Little Rock; Western Missouri at Kansas City and St. Joseph; Kansas at Topeka, and Wyoming at Cheyenne.

Bulletin No. 22, issued by the Wellman-Seaver-Morgan Co., Cleveland, O., has valuable engineering data, and will be sent to engineers and draftsmen free on request. The bulletin shows charts giving the relations in any shaft between power, shaft diameter, torsional stress and speed.

FORD GETS SMALL DAMAGES IN LIBEL SUIT

THE automobile industry and trade followed with interest the suit for \$1,000,000 brought by Henry Ford against the Chicago Tribune, which ended in a verdict of six cents and costs for Ford. Under the Michigan law, costs of not more than \$50 can be assessed when the jury awards nominal damages. It is believed that the total expenses connected with the great legal battle will cost Ford \$250,000 and the Tribune close to \$400,000.

The suit was based on an editorial which appeared in the Tribune June 23, 1916, under the heading, "Ford Is an Anarchist." On the Sunday previous President Wilson issued an order for the mobilization of the National Guard on the Mexican border for duty in case the situation raised by Pancho Villa's raids and President Carranza's attitude toward the American punitive expedition required its service.

The Tribune, which favored intervention in Mexico, sought to encourage enlistments in the National Guard by obtaining assurances from employers that they would hold jobs open for men in the service while away or care for their dependents.

The paper wired its Detroit correspondent, P. W. Williams, to obtain a statement from officials of the Ford Mo-



Henry Ford.

tor Co. as to what the company would do in this regard. According to his testimony he obtained his information from Frank L. Klingensmith, vice president and secretary, to the effect that the com-

pany would do nothing either for its enlisted employees or their dependents, and that on their return the men would be considered as new applicants for employment. The dispatch was printed under the head, "Flivver Patriotism."

The possibility that the attitude of one of the country's greatest employers might have a deterrent effect on the movement espoused by the Tribune, led to a scathing editorial declaring Mr. Ford an enemy of the government. The editorial was written by Clifford Raymond, approved by Tiffany Blake, chief editorial writer, and by Major McCormick.

While Mr. Ford's views had brought him into much criticism from newspapers and public speakers advocating a more vigorous military policy for the United States, this was the editorial which roused him to action.

Probably the most interesting witness called was Mr. Ford himself. He was subjected to a severe cross-examination, which brought out his lack of familiarity with important historical facts and also with the use of simple words. Even his ability to read was questioned. Ford testified that he hired a newspaperman to write the newspaper and magazine articles that had appeared as having been written by Ford himself.

COLLINS MOTORS FORMED TO BUILD CUSTOM CARS.

"Hand tailored" automobiles will be made by the Collins Motors, Inc., recently incorporated at Albany, N. Y. The general offices and factory will be at Huntington, L. I., with metropolitan sales and export offices in New York.

"It has been my ambition," said Mr. Collins, "to demonstrate to the wealthy purchasers of foreign-made cars that it is not necessary to go abroad to secure a motor car with all the refinements and distinctive features that are supposed to be found only in foreign-made cars. All bodies on our cars will be hand-made and built to the measure of the individual purchaser, and his own ideas of upholstery, paint and trimmings are furnished to his order. It is our aim to give each buyer the unusual satisfaction of owning a motor car that combines all the special features in which he is particularly interested.

"A '120' chassis, built only as our 'Country Club' roadster, merges characteristically both speed and smart design. This car is built especially for the club man or amateur sportsman who expects the most from his car in speed, quality and appearance and for which the cost is his least consideration. This model is the outgrowth of an idea developed through years of experience in the manufacture and sale of high grade motor cars.

"Every chassis is tested for speed and ability on the famous Vanderbilt Cup Speedway and a certificate guaranteeing its performance is furnished with every individual car.

"Another longer chassis is designed to support the touring, town and other special hand-made bodies built to satisfy milady's most fastidious notions, bodies whose finish introduce luxurious upholstery and appointments in keeping with these times when traditional charm is the supreme evidence of luxury and perfect taste."

A four-acre factory site located on the Long Island railroad has been purchased and a modern plant of steel and glass will be erected at once. The capitalization of the company is \$400,000, with the following officers and directors: President, Albert H. Collins, formerly vice president of the New R. C. H. Corporation, Detroit; vice president, William B. Brewster, New York; treasurer, Spencer C. Smith, East Orange, N. J.; secretary and general counsel, Charles H. Stoll, New York; Henry S. Brush, Huntington, L. I.

DAILY CAR PRODUCTION RECORDS.

Daily car production records for July follow: Buick, 500; Briscoe, 75; Barley, 10; Cadillac, 70; Chalmers, 65; Chandler, 90; Chevrolet, 730; Columbia, 30; Dodge, 375; Dort, 100; Ford, 3000; Hudson, 110; Hupp, 75; King, 15; Liberty, 40; Maxwell, 200; Oakland, 250; Olympian, 15; Oldsmobile, 140; Overland, 200; Packard, 25; Paige, 75; Paterson, 15; Jordan, 15; Maibohm, 15; Reo, 125; Saxon, 30; Scripps-Booth, 55; Studebaker, 165; Peerless, 12; Winton, 12; Essex, 110; Grant, 40.

NEW PLAN TO CUT CAR THEFT INSURANCE RATES.

A real solution of the motor car theft problem and a reduction on theft insurance rates of at least 50 per cent. is the promise of the Automobile Abstract and Title Co., a million dollar Detroit and Chicago corporation, which proposes to issue abstracts of title for automobiles.

The company believes that no more feasible plan has been advanced for the complete and absolute elimination of the automobile thief and that it will be quite as impossible to steal and sell a motor car so protected as it would be in the case of real estate. In fact, the automobile abstract finds an exact parallel in the abstract issued for real estate—to prove ownership and guarantee title.

From the motorist's point of view the immediate and most important results will be a material reduction in theft rates, which, in many parts of the country are now prohibitive. In addition, the abstract will serve a number of other worthy purposes such as providing information of mortgages, liens and similar legal claims which may exist against a car.

The automobile abstract is the big thought in motor car protection and the company considers it the only logical, business like manner in which \$5,550,000 of motor car wealth can be adequately protected.

New prices for the Franklin follow: Touring, \$2750; brougham, \$3700; sedan, \$3750; four-passenger roadster, \$2750; two-passenger roadster, \$2700.

GRUESOME LESSONS FOR AUTO SPEEDERS

PUNISHMENT for automobile speeders calculated to be as effective as it is strange, was prescribed by Judge John Stelk of Speeders' Court in Chicago.

Defendants in court were ordered by the judge to accompany his bailiff, Edward Spiering, to the county hospital and observe the sufferings of men, women and children whose bodies were racked with pain because of the carelessness of motorists.

From the hospital the personally conducted tour stepped over to the morgue where automobile speeders were compelled to look upon the bodies of two children who met death under the crushing weight of motor car wheels lost to control of the driver over them.

When the vivid object lesson was thus driven into the minds of the offenders they were brought back to the court and paroled for one week. Judge Stelk asked each man to report back and give a version of his views of how automobiles should be driven in Chicago.

GRUESOME WARNING TO AUTOMOBILE SPEEDERS.

It is doubtful if defendants in court on charges of automobile speeding ever were given more emphatic lessons than those imposed by this judge in Chicago. That his handling of the cases was more effective than would be the imposition of fines, even heavy ones, there is no doubt. The average speeder does not think of the danger he is causing others, and the best way to teach him is to reveal to him the grim consequences of reckless driving.

He asked each man to make a written report as to how he thinks automobile accidents might best be diminished in number. He believes the City Council may find some ideas of value in the sug-

gestions offered. Drastic measures have become necessary to cure speeders, Judge Stelk says, because the arrests recently have been only those men who have flagrantly violated the ordinances.

"The police have been so busy with riots and labor troubles they have not had time to bother with minor offenders," he said, "and the ones arrested now are serious law breakers. I want to apply some curative treatment to these men, since many automobile owners obviously are not dealt a very heavy blow when they are fined."

"Gradually, however, our automobile drivers seem to have improved, and for this year the arrests for serious violations of the rules of driving do not equal the number for last year. Sending these men to look directly at the havoc of carelessness may possibly result in some moves that will improve traffic conditions for safety throughout the city. It seems that about everything else has been tried. Anything that makes the streets safer for us is worth trying out, I think."

GOODYEAR BOOK TELLS "THE STORY OF THE TIRE."

A noteworthy addition to tire literature, which will be welcomed by all motorists and others interested in obtaining information concerning how tires are made, is "The Story of the Tire," a booklet now being distributed by the Goodyear Tire and Rubber Co., Akron, O.

This booklet is not designed as an advertising feature, but contains the plain story of the various processes in tire manufacture, tracing it from the sap of the forest tree to the finished product, ready to begin its career of service.

The booklet opens with a foreword calling attention to the exalted position occupied today in the world by rubber—how the tiny drops of sap from the rubber tree, carefully collected, go to make up the hundreds of thousands of tons of crude rubber necessary to supply the world's needs, for rubber is now one of civilization's necessities.

A chapter on "Rubber" shows how the discovery of the secret of vulcanization, by Charles Goodyear, brought rubber from the limited field it formerly occupied, to a place in the commercial world second only to that occupied by steel, and how the rubber tire draws attention to the magnitude of the rubber industry.

Then appears a chapter covering the rise of the Goodyear company from humble beginnings to one of the largest rubber companies in the world, with the important steps in the company's growth.

NEW OVERLAND SCOUT CAR FOR U. S. TRUCK TRAIN.

The Willys-Overland Co., Toledo, has this season introduced new methods for testing automobiles which are a direct development of war experience.

Realizing that the modern motor car must successfully meet the most extreme riding conditions, the company planned and carried out the idea of subjecting the new light weight car the company

has been developing for two years, and which, it is understood, will soon be on the market, to tests which would parallel the rough and ready use motor cars in the war zone daily received.

For these tests unusual "breaking machines" have been rigged up and used in the factory, and the cars have then been sent into rough, untraveled country for most gruelling road performance.

In the preliminary tests the new Overland car showed stamina and riding qualities so remarkable that the car was selected as the official scout car in the first transcontinental test trip of the United States Motor Transport Corps, which started at Washington, D. C., July 7, and is expected to arrive about Sept. 7 in San

Francisco. The route being followed by the Motor Transport Corps is that of the Lincoln Highway.

This transcontinental trip has been undertaken to establish and demonstrate the possibilities of the motor vehicle as a factor in coast-to-coast transportation. It is to serve as a supreme test of the utility and dependability of the modern motor vehicle.

With the army trucks participating in this convoy are three of the new light Overland cars which will be put on the market this season by the Willys-Overland Co. The cars on this tour, according to report, are making a record for comfortable riding qualities, roadability and all-around utility.



Overland Mystery Car, Scout for Motor Transport Train.

N. A. C. C. Committees Are Appointed By Clifton

Charles Clifton, president of the National Automobile Chamber of Commerce, has appointed the following committees, which are to handle the activities of the business organization during the coming year:

PASSENGER CAR SHOW COMMITTEE

John N. Willys, chairman, Willys Overland Co.; H. G. Root, Westcott Motor Car Co.; Harry M. Jewett, Paige-Detroit Motor Car Co.; S. A. Miles, show manager, National Automobile Chamber of Commerce.

PATENTS COMMITTEE.

C. C. Hanch, chairman, Maxwell Motor Co.; Windsor T. White, White Motor Co.; C. W. Churchill, the Winton Co.; Wilfred C. Leland, Lincoln Motor Co.; Wm. MacGlashan, Studebaker Corporation; Robert A. Brannigan, manager, National Automobile Chamber of Commerce.

LEGISLATIVE COMMITTEE.

H. H. Rice, chairman, Chevrolet Motor Co.; D. C. Fenner, Mack Bros. Motor Car Co.; J. I. Farley, Auburn Automobile Co.; J. I. Barrows, Lexington Motor Co.; David Ludlum, Autocar Co.

HIGHWAYS COMMITTEE.

R. D. Chapin, chairman, Hudson Motor Car Co.; W. E. Metzger, Columbia Motors Co.; Royal R. Scott, Willys-Overland Co.; S. M. Williams, Garford Motor Truck Co.; Geo. M. Graham, Pierce-Arrow Motor Car Co.; Pyke Johnson, secretary, National Automobile Chamber of Commerce.

TRAFFIC COMMITTEE.

William E. Metzger, chairman, Columbia Motors Co.; A. I. Philp, Dodge Brothers; F. C. Chandler, Chandler Motor Car Co.; William L. Day, General Motors Truck Co.; Geo. Dickson, National Motor Car and Vehicle Co.; J. S. Marvin, manager, National Automobile Chamber of Commerce.

ELECTRIC VEHICLE COMMITTEE.

W. C. Anderson, chairman, Anderson Electric Car Co.; Fred R. White, Baker R & L Co.; H. W. Suydam, Milburn Wagon Co.

MEMBERSHIP COMMITTEE.

C. W. Churchill, chairman, the Winton Co.; J. Walter Drake, Hupp Motor Car Corporation; Hugh Chalmers, Chalmers Motor Co.

FOREIGN TRADE COMMITTEE.

J. Walter Drake, chairman, Hupp Motor Car Corporation; Peter S. Steenstrup, General Motors Truck Co.; H. M. Robins, Dodge Brothers; Jay Rathbun, White Motor Co.; E. C. Morse, John W. Willys Export Corporation; J. P. Roberts, Studebaker Corporation; H. B. Phipps, Hudson Motor Car Co.; H. R. Cobleigh, secretary, National Automobile Chamber of Commerce.

CONSERVATION COMMITTEE.

W. C. Sills, chairman, Chevrolet Motor Co.; G. R. Lippard, Stewart Motors Corporation; M. Cook, Service Motor Truck

Heads Rural Motor Express Committee



James L. Geddes.

Co.; F. E. Bradfield, Velie Motors Corporation; C. A. Baird, Jas. Cunningham Son & Co.

MOTOR TRUCK COMMITTEE.

Windsor T. White, chairman, White Motor Co.; Alvan Macauley, Packard Motor Car Co.; George M. Graham, Pierce-Arrow Motor Car Co.; Victor L. Brown, Sterling Motor Truck Co.; M. L. Pulcher, Federal Motor Truck Co.; R. H. Salmons, Selden Motor Vehicle Co.; D. C. Fenner, Mack Bros. Motor Car Co.; F. W. Fenn, secretary, National Automobile Chamber of Commerce.

RURAL MOTOR EXPRESS COMMITTEE.

James L. Geddes, chairman, Kelly-Springfield Motor Truck Co.; E. A. Williams, Jr., Garford Motor Truck Co.; O. H. Browning, International Harvester Corporation; A. T. Murray, Bethlehem Motors Corporation; Geo. D. Wilcox, Commerce Motor Car Co.; F. W. Fenn, secretary, National Automobile Chamber of Commerce.

TRUCK STANDARDS COMMITTEE.

David C. Fenner, chairman, Mack Bros. Motor Car Co.; Francis W. Davis, Pierce-Arrow Motor Car Co.; F. A. Whitten, General Motors Truck Co.; B. M. Sternberg, Sterling Motor Truck Co.; F. F. Beall, Packard Motor Car Co.

HAND BOOK COMMITTEE.

E. T. Strong, chairman, Buick Motor Co.; F. H. Akers, Reo Motor Car Co.; Geo. A. Kissel, Kissel Motor Car Co.; Wm. T. White, Mercer Auto Co.; Chas. Denby, Denby Motor Truck Co.

TRUCK COMMITTEE ON STANDARD REPAIR PARTS & SERVICE POLICIES.

E. T. Herbig, chairman, Service Motor Truck Co.; H. W. Drew, Packard Motor Car Co.; W. M. Ladd, Pierce-Arrow Motor Car Co.; A. B. Cumner, Autocar Co.; W. M. Britton, Republic Motor Truck Co.

Municipal Bus Service Planned by Hylan in New York

Mayor John F. Hylan of New York has a plan for establishing a system of city owned buses throughout the city to compete with the street car lines. He prophesies the doom of the street cars, and says it will not be long before the municipal buses will be operating in great numbers all over the city.

"A lot of people," says Mayor Hylan, "say that bus service might cost more than five cents. The answer to that is that I now have a proposition from a private concern to run five-cent buses. If a private concern can do it, I am sure that the investigation to be made by the Board of Estimate will demonstrate that we can have five-cent buses."

"Traction people will begin to have all kinds of objection to bus operation. They will probably tell us we will have tire trouble and that we will have to repave lots of streets. I expect them to be very insidious and active against me. But when we call the automobile people and the tire people in to help us solve these problems I am sure they will be mighty glad to see the biggest city in the world modernize its traction methods and they will wipe out all such objections."

The mayor believes that a bus express service could be established, the buses making long distance trips down town and up town during the rush hours without stopping except at long intervals.

Mayor Hylan says he noticed that the Broadway Association was in favor of bus lines and he thinks that it is very intelligent in this matter. He believes it would be a good idea if local associations would immediately begin studying the question and make suggestions to him about the needs of their districts. Speaking of service for ball games, he says:

"After a big ball game the crowd has a frightful time to get started home, and the last car, the one nearest the ball ground, cannot start away until the forward car is filled. A fleet of buses could be stationed all around the ball park to handle the crowd, and each bus could start as soon as it was filled."

Other crowds would be taken care of in the same way.

GARDNERS PLAN CAR.

The Gardner Motor Car Co., St. Louis, incorporated for \$2,000,000, plans to make a small, moderately priced car, first models of which are expected to be ready for display in October. The 1920 schedule provides for 15,000 cars. The corporation is headed by Russell E. Gardner, Sr., and Russell E. Gardner, Jr., will be vice president in charge of sales.

Roger Babson, statistician and a director of the Bay State Railway Co., told the Federal Electric Railways Commission that automobiles were responsible for much of the street car traffic loss. With 5000 street cars in Massachusetts there are 186,000 automobiles running.

Gettysburg Proves An Interesting Tour For Motorists

GETTYSBURG is a powerful magnet for the motorist, and it is said that the number of automobile tourists who visit the battlefield each year now exceeds the number engaged on both sides there on July 1, 2 and 3, 1863. In fact, the armies of Meade and Lee were drawn to that little inland Pennsylvania town principally because it was the converging point for so many thoroughfares, or pikes.

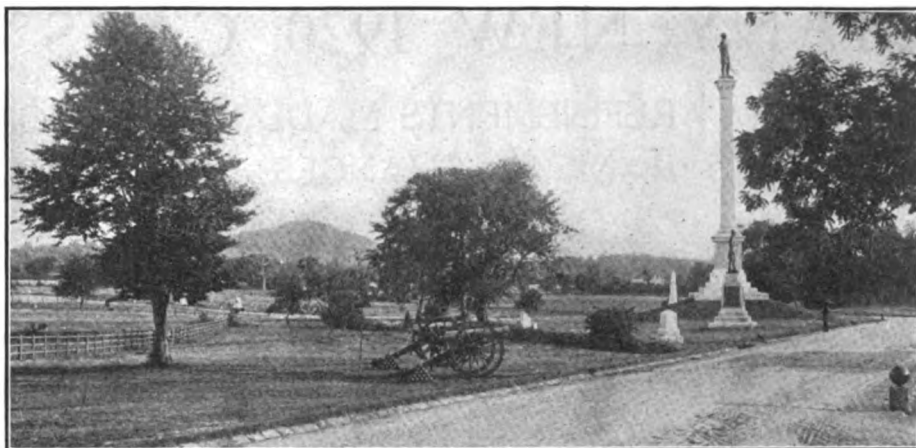
Lincoln Highway tourists will find Gettysburg a convenient point, being 116 miles from Philadelphia. The itinerary from Philadelphia follows: Wayne, Pa., 14 miles; Coatsville, Pa., 38; Lancaster, Pa., 65; York, Pa., 88; Gettysburg, 116.

Road travelers have the best means of observing the topographic features of the surrounding country, as well as the battle area itself. In order to make the trip thoroughly interesting and enjoyable, the reference data should be written from the special viewpoint of the tourist, and made available in convenient and inexpensive form.

Robert Bruce, Clinton Co., New York, has done this in a 32-page brochure, which includes a map of Gettysburg, showing the principal streets and avenues leading in and out, a special map of the battlefield and a number of fine illustrations. The brochure is entitled, "Gettysburg for the Motorist," price 50 cents, and may be obtained by mail from Mr. Bruce.

Approaching Gettysburg.

"Looking well ahead from the gentle down grade by which Gettysburg is approached from the east," states the brochure, "the tourist observes the outlines of what would seem to be the ordinary quiet inland Pennsylvania town of its size—somewhat under 5000—except for two very marked features, its road system and the peculiar topography



A Typical View at Gettysburg.

immediately south of it. An unusual number of highways or pikes, of which the four basic ones lead straight outward from the square at the center, while the greater number diverge at well defined angles a short distance from it, and extend in all the principal directions.

"The street system of the town itself closely resembles a great checkerboard of irregular shape, from all sides and ends of which long, straight lines have been drawn as far outward as the eye can see. Gettysburg is a liberal 'hub' of highways, possibly the greatest road center of its size in the United States, a fact made all the more conspicuous by its location off from all main lines of railway travel.

"No physical features along the route we have been following toward the town attract particular attention; nor are any observed to the north of it. Glancing ahead—over the top of Gettysburg—the Chambersburg pike appears like a narrow white band or streamer laid down carefully upon and drawn tightly across the rolling landscape whose minor details are gradually obscured in the distant horizon. But a totally different scene is presented only a short distance south of where our main route is soon to pass through the town.

Unusual Topography.

"The essential and most striking features of the locality are best seen while approaching Gettysburg from this direction, and perhaps three or four miles before reaching the lower levels upon which it is situated. Below the town and the pike there begin to rise almost at once a series or group of bluffs and hillocks, which not only command the surrounding country for observation purposes, but make defenses of great natural strength.

"Extending at first almost due north and south, just west of them, is Seminary Ridge, the first of several minor ranges which form an intermediate stage between the rolling highlands which extend westward from the Susquehanna river to this section, and the steeper grades of South Mountain on the continuation of the route to Chambersburg.

"Farther down, however, Seminary Ridge is drawn slightly eastward in a

way to form a rough curve, resembling a bended wrist. Just east of that rough curve, and amply protected by it on the west, is Big Round Top, a rocky wooded peak, of which Little Round Top, a trifle farther north, is a spur. Theodore Ayrauld Dodge likens this unusual bit of topography to a fish hook, whereon Culp's Hill rises as a barb along the back of Cemetery Hill, while Cemetery Ridge forms the shank, terminating east of the curve, in the big and little 'round tops.'

"These topographical features and the highways are the keys to a correct understanding of the military movements leading up to the battle of Gettysburg, as well as to the conflict itself.

"The motorist approaching Gettysburg from any of the principal directions is likely to be met at about the first prominent landmark by one or more professional guides, who solicit the opportunity to show the party about the town and the battlefield. Especially when one's time is short, it may be advantageous to employ one of them, agreeing in advance as to the route of observation, time to be spent, fees and the like."

Regulations for the National Military Parks provide that those offering their services as guides in the park must be licensed.



Marker to Hall's Second Maine Battery.



MANY NEW 1920 CARS ANNOUNCED

REFINEMENTS MADE IN ALL MODELS, BUT NO RADICAL CHANGES DUE TO WAR LESSONS

MANY of the car makers have already introduced their new 1920 models. In all of them there have been numerous refinements, which make them better vehicles than their predecessors, but no radical changes due to lessons learned during the war have been adopted. The demand for nearly all of the new models is so great that the prospective buyers will have to exercise patience after placing their orders.

BUICK.

Numerous minor changes have been made in the new 1920 model K Buick series. The company announces that "there is not a single part entering into the construction of the 1920 Buick car that is not as good as, or better than, the same part used at any previous time," and, further, "that the design has been improved and quality elevated."

The Buick Motor Co. takes pride in the fact that buyers have such complete confidence in the maker that orders are coming from persons who have not even seen the models. "The most difficult situation that confronts the prospective Buick purchaser," states the announcement, "is the matter of car delivery, for demands are increasing daily for these famous valve-in-head motor cars."

The prices follow: Model K-44, three-passenger roadster, \$1495; model K-45, five-passenger touring, \$1495; model K-46, touring coupe, \$2085; model K-47, five-passenger touring sedan, \$2255; model K-49, seven-passenger touring, \$1785; model K-50, seven-passenger sedan, \$2695.

In the motor the oil well wing plug has been removed owing to its uselessness with present construction and cover. The material of the oil pump drive gear has been changed to die cast bronze, which permits the use of one-piece steel cone shaft, which is of a more sturdy construction than the two-piece built-up shaft. The fan spider and blades have

been made of heavier material to prevent bending. The fan belt is an improved design to prevent climbing on pulley line.

In the electrical equipment head lamps of new design have been adopted. The design of the spark plug terminal has been changed to lock it positively to the spark plug. In the chassis the transmission end plate has been redesigned to attach speedometer driving gears and accommodate installation of the new Champion speedometer. Adjustable stops have been provided to regulate turning radius of the car.

There are many refinements in the body and top. Much heavier deck quarter and curtain material are being used. The models K-44 and K-45 have been provided with door curtains. In models K-46, K-47 and K-50 the roofs have been lowered without sacrificing head room, this giving the job a low, rakish and improved appearance, and in each of these models the cowl has been redesigned to accommodate pilot sidelights.

REO.

In response to an insistent demand on the part of Reo distributors for a six-cylinder motor that would fit into the standard Reo chassis, the Reo engineers, some two years ago, set to work on the design of such an engine. The new six motor is now installed in the 1920 models. The six cylinders are cast en bloc, yet there are four main bearings. It is of the L type and, as in all Reo motors, the intake valves are located in the head, the exhaust in the L projection. All valve mechanisms are readily accessible. A notable feature is the oiling system by which not only pistons, connecting rods, cams, etc., but the rocker arms and valve stems are kept always flooded with oil. Another great improvement in design is in the removable multi-cylinder head. The intake passages are "cored" through this casting so that the gas is pre-heated to just the right degree.

The bore is 3 3/16 and the stroke five, with 24.3 horsepower S. A. E. or N. A. C. C. rating. The actual development is 50 horsepower at 2000 revolutions per minute. The oil pan is removable for adjustment of bearings or withdrawal of pistons and rods. Lubrication is by combination force feed from submerged plunger pump to main bearings, cam gears and inlet valve mechanism, and constant level splash to cylinders and connecting rod bearings.

The old radiator with the sharp peak right under the filler cap has been replaced with a radiator having a flat face. For the present production will be confined to a five-passenger touring model, followed by a roadster, both of which will retail for \$1650 at the factory of the Reo Motor Car Co., Lansing, Mich. There will be only one chassis model, upon which will be mounted the various types of bodies, which will later include the five-passenger sedan and the four-passenger coupe.

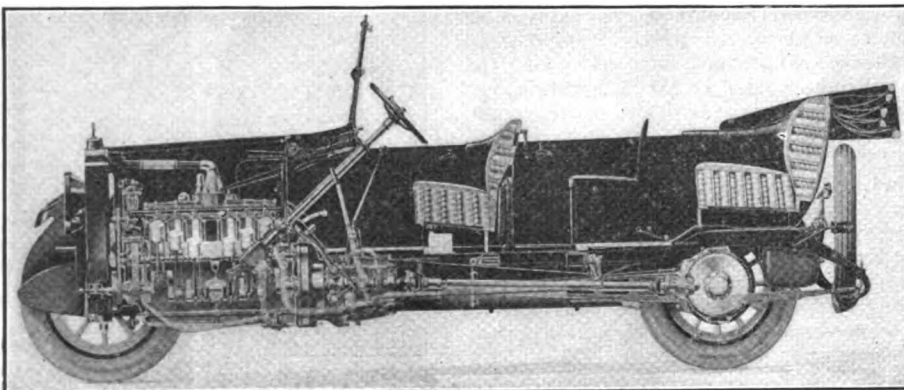
STUDEBAKER.

The new Studebaker cars are all designed with transmissions separate from the motor, thus eliminating the heavy housing required for the unit system and providing a more flexible system of power application. The importance of accessibility has never been lost sight of in the design of the new chassis. Parts have been so placed as to be readily accessible with minimum effort and loss of time. Cleanliness and economy have been sought by designing rear axles, motors and transmissions to eliminate all oil leakage.

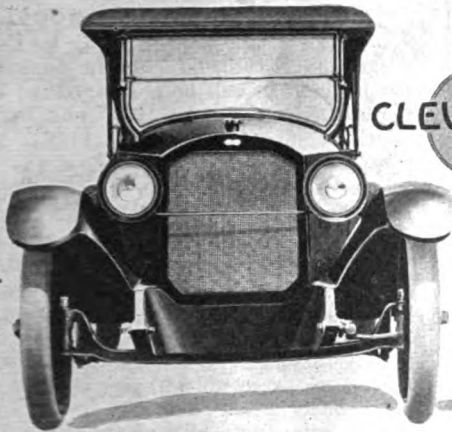
Carburetion has been carefully studied, with the adoption of improvements. The motors are rugged in construction, flexible in operation and accessible. Cylinders are of the L head type, cast en bloc. The light four and the light six are 3 1/2 x 5, developing 40 and 50 horsepower respectively. The big six motor is 3 7/8 x 5, with demountable head, developing 60 horsepower.

The crank case has been strengthened by the addition of ribbed flanges, together with additional ribbing around main bearings. A duplex system of lubrication is a notable feature. Valve push rods are of the mushroom type, located on the left side of the motor. Cooling is by a centrifugal pump circulating system with large tubular radiator and four-bladed fan. The Studebaker-Wagner two-unit electrical system, with improvements, is used on all three new models. Ignition is of the battery type, and an improved Remy system, with new type weather-proof cap, is used.

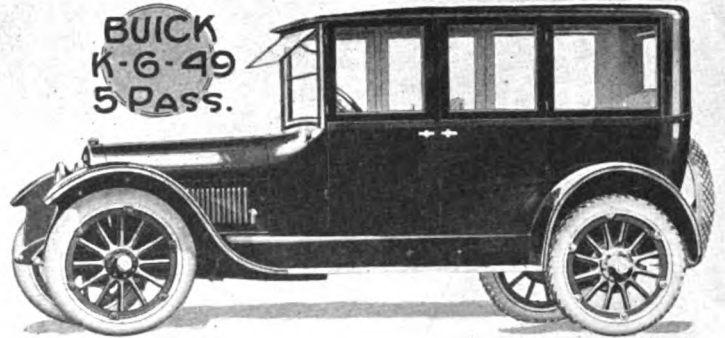
The models are the big six, seven passengers; the light six, five passengers, and the light four, five passengers.



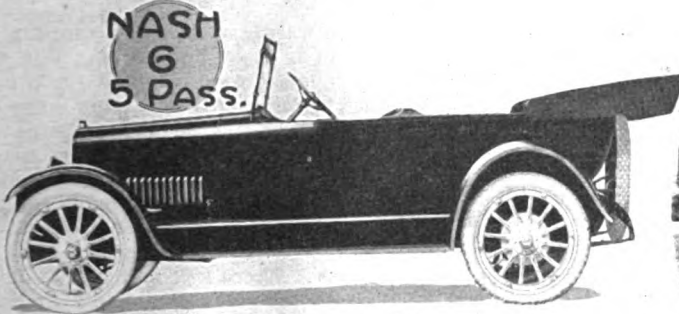
Cutaway of Packard, Showing Internal Working Parts and Other Features.



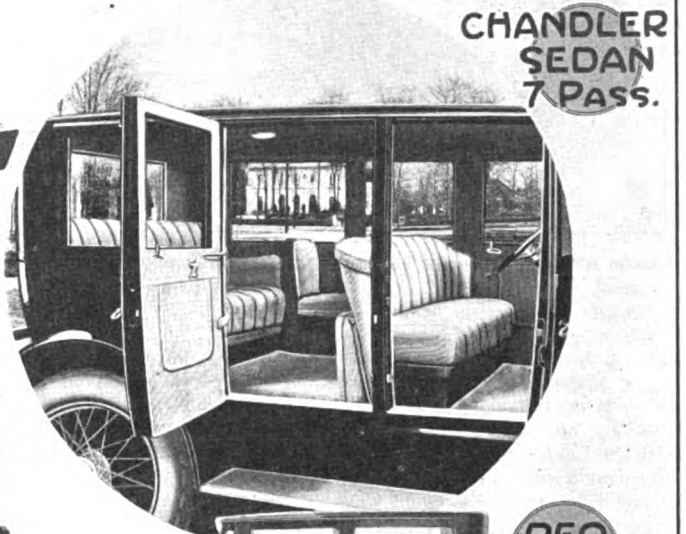
CLEVELAND



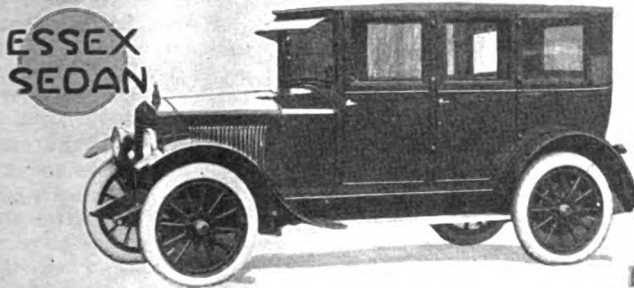
BUICK
K-G-49
5 Pass.



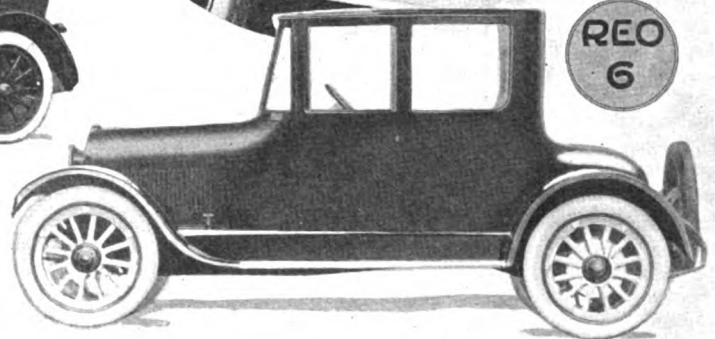
NASH
6
5 Pass.



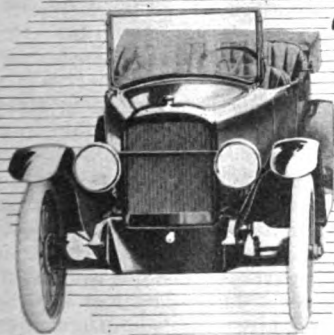
CHANDLER
SEDAN
7 Pass.



ESSEX
SEDAN



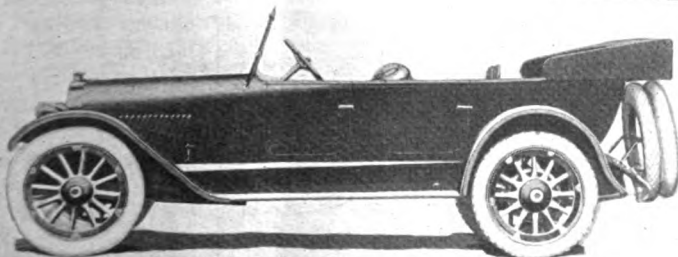
REO
6



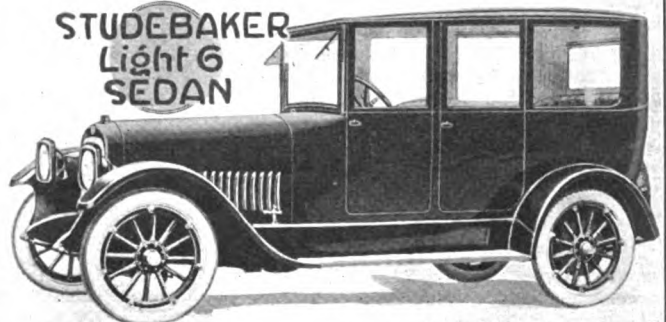
ALLEN
41



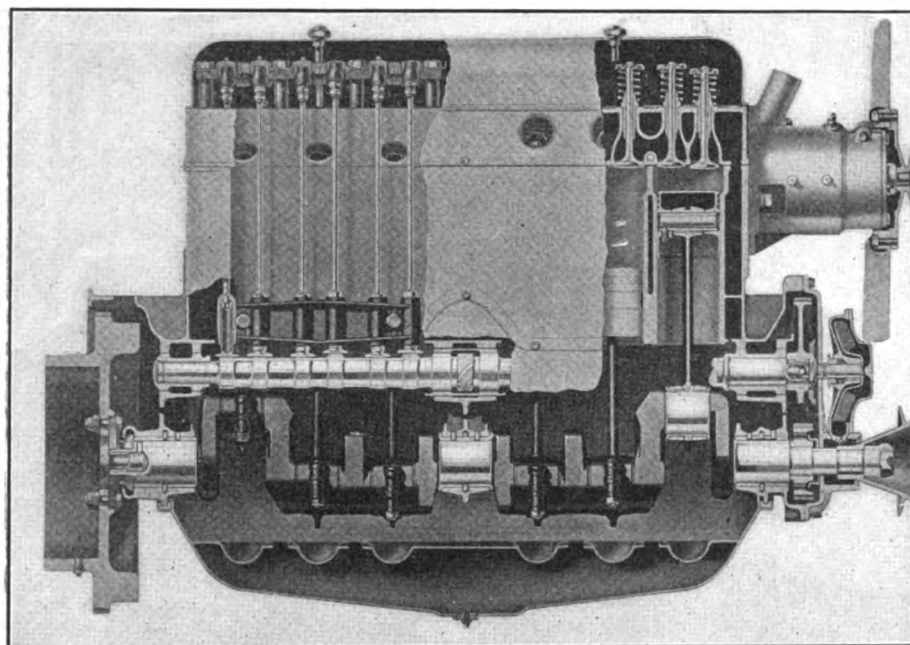
HAYNES



45-B
OLDSMOBILE



STUDEBAKER
Light 6
SEDAN



Nash Engine, Showing Removable Cylinder Head and Operation of the Valves and Valve Mechanism.

CLEVELAND SIX.

The Cleveland Six has a six-cylinder, valve-in-head motor, $3 \times 4\frac{1}{2}$, the cylinders cast en bloc separate from crankcase, with detachable cylinder head. The valve mechanism is completely enclosed. There is a three-bearing crankshaft of large diameter. The camshaft and accessories are driven by an adjustable silent chain. Lubrication is by gear pump positively driven by spiral chain from camshaft. The carburetor is a Stromberg, fed by vacuum tank from a 16-gallon tank at rear of chassis. Other specifications are:

Ignition, distributor and high-tension coil, Bosch magneto optional at extra cost; starting and lighting, Gray and Davis two-unit system; cooling, centrifugal pump, cellular radiator and adjustable self-oiling belt driven fan; transmission, unit power plant construction with central control, three speeds and reverse, nickel steel gears and shafts, main shaft mounted on annular ball bearings; clutch, disc type; propeller shaft, fitted with double universal joints; rear axle, floating type, pressed steel housing, spiral bevel gears; front axle, drop forged I beam, chrome nickel steel spindles and steering arms, Timken bearings in wheels; springs, semi-elliptic front and rear, bronze bushed eyes, rear springs underslung; steering gear, worm and sector type, irreversible, fitted with 18-inch walnut wheel; wheels, wood, artillery type; rims, Firestone, straight side, demountable; tires, 32x4, non-skid rear; wheelbase, 112 inches; top, one-man type, fitted with door-opening curtains and bevel glass rear window; body, Cleveland blue; hood, fenders and running board, black enamel; wheels and chassis, black.

The models are: Five-passenger touring car, three-passenger roadster, five-passenger sedan and four-passenger coupe.

OLDSMOBILE.

Oldsmobile engineers have evolved mechanical refinements that make the new seven-passenger touring model worthy of its name, "The Thorobred." Riding comfort is assured by the long, semi-elliptic rear springs and the unique method of suspending the weight of the car. The extreme length, 56 inches, permits great flexibility. The engine is of the eight-cylinder V type, with 90-degree angle between cylinders, which are cast four en bloc with detachable heads. The bore is $2\frac{7}{8}$ inches and the stroke $4\frac{1}{4}$, with 58 horsepower block test.

CHANDLER.

The new Chandler touring car even surpasses its immediate forerunner in beauty of line, in bigness, in comfort of its cushioning, in the nicety of its custom like workmanship and in its finish. Its high hood and radiator, its broad cowl and its wide and deep doors give it distinctive appearance. The new models are: Seven-passenger touring car, four-passenger roadster, four-passenger dispatch car, seven-passenger sedan and four-passenger coupe.

Refinements have been made that add to the smoothness and ease of operation.



New Dual Valve 48 Horsepower of Pierce-Arrow.

ENGINEERS REFINE NEW PIERCE-ARROW DUAL VALVE MODEL.

Ignition in the Pierce-Arrow dual-valve six henceforth will be accomplished by a double battery system, designed by the Delco company in cooperation with Pierce-Arrow engineers.

"The advantages of this improvement are manifold," said David Ferguson, chief engineer of the company. "The new system is as reliable as the magneto-battery system and fully overcomes the difficulty of synchronization. Preignition from the magneto at high speed no longer is possible. Instead, two timers and distributors, working in unison, give sparks simultaneously at all speeds."

The company's announcement continues:

"Outwardly, a smoother running of the engine is most noticeable. The engine picks up more quickly and smoothly and runs more positively at low speed. An automatic spark advance eliminates the necessity of manipulating the spark advance lever for all ordinary running.

"No sacrifice has been made in reliability. A new generator of increased capacity will meet the requirements of the battery. There will be little chance of a battery becoming completely discharged, and only in this state would ignition be effected. A weak battery possesses sufficient current for ignition and once the engine is started the generator immediately begins to recharge the battery at a rapid rate.

"As a matter of fact the magneto system formerly used gives no advantage in case a battery becomes so weakened that the starter fails to rotate the engine. Drivers who sometimes have started an engine by cranking when the starter failed to work have thought they were starting through the aid of magneto ignition. In reality the battery, although weakened, furnished this energy. The present engine is so large that it is practically impossible to crank it rapidly enough to generate sparking current with the magneto.

"Most important, however, is the fact that every safeguard possible to conserve the battery current has been devised. When the car is left in a locked position the battery automatically is disconnected from the engine and the head lamps are shut off. The small bulbs used for signal purposes at night can be turned on however. They consume so little current that there is no danger of battery depletion.

"The new double-battery system was incorporated in the dual-valve six only after exhaustive tests had been made by the company's engineers. It was adapted to Pierce-Arrow design after Liberty airplane practise had proved its reliability, a most vital factor in airplane engine design."

GLEANINGS FROM THE AUTO WORLD

Boston Pedestrians Must Obey Traffic Officers' Signals—Million Fords for Coming Year—New Jersey and Pennsylvania War on Motor Car Thief—Chinese Want Good Roads for American Machines

IN BOSTON the pedestrian must obey the signals of a traffic officer, the same as a driver. The police commissioner resurrected an old ordinance which gives the police authority to enforce the new ruling. Hitherto those on foot have been enabled to cross a street regardless of the direction vehicular traffic was taking at the time. But now when the officer signals traffic to go in a certain direction, the pedestrian must not ignore the signal. If traffic is going in the direction opposite to which he is headed, he must stop until the policeman signals for a change. The new ruling was made as a part of the "Safety First" campaign. Motorists are greatly in favor of it.

Fords are to become thicker than ever if Henry and his son, Edsel can adhere to their mammoth production schedule, which calls for 1,000,000 cars during the coming year. Production now averages 3000 daily. More than 500,000 cars were turned out during the year ending July 31. Starters will be put on all models as soon as the output permits. Some cars are equipped with demountable rims because it was impossible to secure standard Ford rims, but they will not become part of the standard equipment.

New Jersey and Pennsylvania have taken the lead toward putting a stop to the increasing thefts of automobiles. Under the provisions of the New Jersey law, which went into effect last month, it is now necessary for any one, dealer or otherwise, who wishes to dispose of an automobile, to show a bill of sale, witnessed by two persons and acknowledged before a notary public. The law also makes it illegal to sell or buy a motor vehicle with obliterated or mutilated manufacturer's numbers. The law has its effect upon New York owners of cars applying for licenses in New Jersey in that the commissioner of motor vehicles there refuses to grant a license unless the applicant produces his bill of sale. This requirement applies equally to owners of any other state desiring New Jersey licenses. Pennsylvania adopted a law very similar to that of New Jersey, requiring duly attested bills of sale, and

also providing that car thieves shall be fined not exceeding \$5000 and be liable to imprisonment for 10 years.

There is an acute scarcity of skilled labor in the motor industry. There are

decided desire for motor cars whenever their use is possible, it seems probable that some cooperative plan would produce good results.



good opportunities for skilled labor along any line connected with the industry. This offers an especially attractive field to former service men.

Giving the motorist or chauffeur a chance for his driving life is what Secretary of State Francis M. Hugo is doing by holding monthly hearings in New York of those cases wherein the licenses to drive of the defendants were recommended for revocation by the magistrates after a hearing on preferred charges. Those convicted of the grossest violations have the opportunity of introducing new witnesses at these hearings. They may present any evidence in their favor that was not brought out during their arraignment as prisoners. Complainants are notified of the hearings that they also may be heard.

The use of motor cars has been made possible in Foochow, China, by the enterprise of the provincial officials, who have spent recently \$280,000 in improving the roads, which has enhanced the value of land and caused the construction of modern buildings. The suggestion has been made by prominent men in China that it would pay a combination of motor car companies to finance loans to the different provinces to be used only in road construction. The market for motor cars is strictly limited by the lack of good roads, and, as the Chinese have shown a

"Whenever a Haynes car is reported to the factory as having been stolen," says Mr. H. R. Perry, manager of the service department, "a letter is sent out to every Haynes dealer in the United States, giving the factory numbers of all the parts of the stolen car, with a warning to the dealers to keep a close lookout for a car bearing these numbers.

"When such a car is brought to a Haynes station for new parts or for sale, the dealer holds the car and notifies the local police at once. In this way many automobile thieves have been caught and many cars recovered. Sometimes a request is sent to the factory for a part to be replaced on a car listed as stolen. The factory then advises the police of the town from where the request has come and they immediately investigate the case."

A London cablegram from Special Trade Commissioner Burwell S. Cutler, recently director of the Bureau of Foreign and Domestic Commerce, announces that the British (government) Board of Trade is to grant free licenses for the importation of 5000 automobiles, including trucks over 1½ tons.

Wm. Wrigley, Jr., the chewing gum king, has extended his activities from chicle and baseball to the automobile industry. He has just been elected a director in the Auburn Automotive Co., after having purchased a large block of stock in the enlarged Indiana corporation. After 19 years of manufacturing, the Auburn Automotive Co., with an unprecedented business on its books for the year, decided to practically treble its output, with the result that the official personnel has been considerably strengthened through the addition of men well known in business and finance. Maurice Eckhart, president and general manager, who has been with the company since its inception, continues in the same capacity.

LICENSE PLATES IN VARIOUS STATES



Registration Fees

Registration fees are as follows:

Indiana, less than 25 horsepower, \$5; 25-39 horsepower, \$8; 40-49 horsepower, \$15; 50 horsepower or over, \$20; New York, 25 cents for each horsepower, plus 40 cents for each \$100 of the list price for first three years, 20 cents for fourth and fifth years and 10 cents for other years; Idaho, 2000 pounds or less, \$15; 3000, \$20; 4000, \$30; registration fee exempting car from personal property tax.

Massachusetts, \$5 to \$25, according to horsepower; California, 40 cents per horsepower; Kansas, \$5; Mississippi, 24 cents per horsepower; minimum, \$5; Wisconsin, \$10; Connecticut, 1-10 horsepower, minimum, \$5; with 50 cents for each additional horsepower; Iowa, \$8 to \$34.56, according to horsepower; Florida, \$3 to \$15, according to horsepower; Georgia, 25 horsepower, \$2; 40 horsepower, \$4; over 40, \$5; Minnesota, \$5 for three years' registration.

West Virginia, 2000 pounds, \$10, with 25 cents for each additional 100 pounds; Delaware, each 200 pounds, \$2; Nebraska, 2000 pounds, \$10; with 50 cents for each additional 100 pounds; South Carolina, 25 cents per horsepower; Ohio, \$5; District of Columbia, \$2; Montana, 23 horsepower, \$5; 50 horsepower, \$10; over 50, \$15; Wyoming, fee by quarters, \$2 to \$5; Louisiana, 25 cents per horsepower; minimum, \$5.

New Mexico, \$6 to \$12, according to horsepower; Texas, 35 cents per horsepower; New Jersey, 10 horsepower, \$4.50; 29 horsepower, \$7.50; 30 and over, \$15; Missouri, \$4 to \$24, according to horsepower; Vermont, first year, \$1 per horsepower; second year, 75 cents per horsepower; third year and thereafter, 50 cents per horsepower; Utah, 25 horsepower, \$5; 40 horsepower, \$10; 40 and over, \$15; Michigan, 25 cents per horsepower and 25 cents for each 100 pounds.

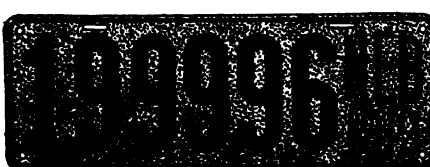
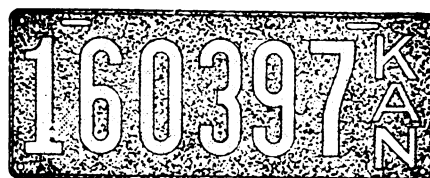
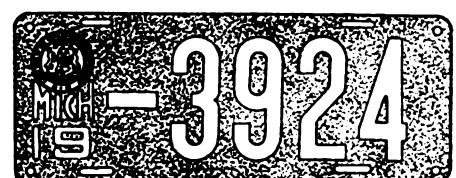
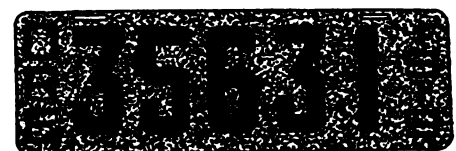
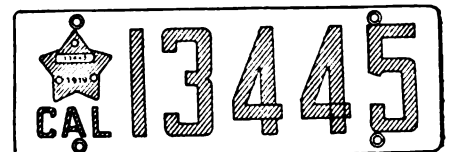
Maine, 15 horsepower, \$5; 35 horsepower, \$10; over 35, \$15; Kentucky, 25 horsepower, \$6; 50 horsepower, \$11; over 50, \$20; Illinois, 10 horsepower, \$4.50; 25 horsepower, \$6; 35 horsepower, \$9; 50 horsepower, \$16; over 50, \$20; Arizona, 25 horsepower, \$5; 40 horsepower, \$15; Rhode Island, \$5 to \$25, according to horsepower; Alabama, \$7.50 to \$20, according to horsepower; Colorado, \$2.50, \$5 and \$10, according to class; Washington, 1500 pounds, \$10; over 1500, \$20, and 60 cents per 100 pounds in excess of 1500.

New Hampshire, \$10 to \$40, according to horsepower; Virginia, 40 cents per horsepower; Oregon, 26 horsepower, \$6; 36 horsepower, \$10; 40 horsepower, \$15; over 40, \$20; Maryland, 60 cents per horsepower for cars using pneumatic tires, with minimum of \$10; West Virginia, 2000 pounds, \$10; each additional 100 pounds, 25 cents; Pennsylvania, 20 horsepower, \$5; 35 horsepower, \$10; 50 horsepower, \$15; over 50, \$20.

Color of Plates

Alabama—White on dark green.
 Arizona—White on black.
 California—Blue on white with red star containing year and maker's number of car.
 Colorado—Aluminum on dark brown.
 Connecticut—Black on white.
 Delaware—White on blue.
 District of Columbia—White on olive green.
 Florida—White on orange.
 Georgia—Black on white.
 Idaho—Tan on dark green.
 Illinois—White on light brown.
 Indiana—White on black.
 Iowa—White on chocolate brown.
 Kansas—Dark blue on sky blue.
 Kentucky—White on bright green.
 Louisiana—Black on pea green.
 Maine—White on maroon.
 Maryland—Black on white.
 Massachusetts—White on black.
 Michigan—White on brown.
 Minnesota—White on black.
 Mississippi—White on dark green.
 Missouri—White on dark blue.
 Montana—Black on pale green.
 Nebraska—Black on green.

(Continued on Page 33.)

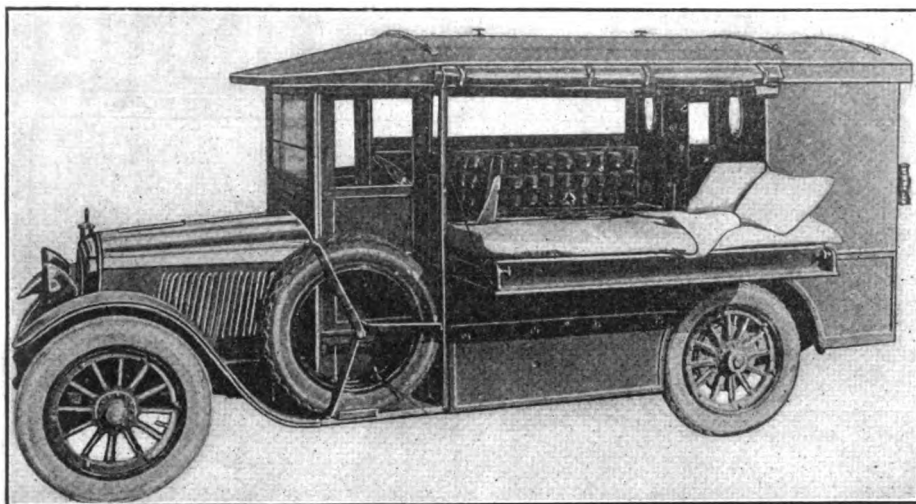


This Motor Vehicle Makes a Fine Traveling Home With All Comforts

THE much mooted question as to whether an automobile is a passenger or a pleasure car certainly does not arise in the case of the car shown in the accompanying photograph.

This car was built in the Curtis Pneumatic Machinery Co.'s shops, for the personal use of its vice president, G. F. Steedman, and family, enabling him to take a much needed vacation, after almost two years of constant application to the immense munition contracts which the Curtis company has completed for the American and British governments.

In the rear of the car are three full size clothes lockers with coat hangers, four large individual wardrobe drawers, with chiffonier top and mirror over the drawers, to say nothing of the individual mirrors in the clothes lockers; also a dining room table, seating four; a three-burner gasoline stove with pressure feed system; an oven, a portable kitchen sink and drain, a kitchen cabinet, an ice storage chamber, a disappearing bread board, a pneumatic water system with 30-gallon storage tank for drinking water purposes, provided with outside overflow; a



Traveling Home of G. F. Steedman and Family.

The car is made in St. Louis throughout, the chassis being a Dorris "6-80" with a heavy duty ambulance type rear axle, otherwise standard as to gear ratio and equipment, fitted with 35x5 tires. The body and its equipment were made in the Curtis company's shops under the personal supervision of Mr. Steedman and his brothers, E. H. and J. H., president and vice president respectively.

A smaller edition of the car, on a Ford truck chassis, has also been built for the president, E. H. Steedman.

The great trouble in going on a hunting trip has been, heretofore, that the best hunting is always furthest away from civilization, and where the game is there are practically no accommodations anywhere near. With such a car as this the accommodations are carried right into the wilds and headquarters made in the lair of the game itself.

The car is built with the idea of being a traveling home for four people, although strictly it has a seating capacity for eight. The cushions, which form the long seats in the day time, make up at night into two full size double beds. The backs of the seats have folding legs, which make them into upholstered camp chairs. Inside Palm Beach type sunshades and outside storm curtains are provided, the sides of the car folding down and the storm curtains completely enclosing same at night. Mattresses and complete bedding equipment are carried under the long seats.

gun locker, a tin lined game locker, a broom, a mop, laundry equipment and portable foot bath.

The car is also supplied with a complete lighting system, having interior dome lights, portable reading lights and electric fan, this electric system being entirely independent of the ignition system of the car.

The roof of the car has adjustable ventilators and on top is provided a canoe rack. On the outside of the car are carried the two spare rims and tires, completely inflated; portable hand acetylene lanterns and fire extinguishers. The power plant is equipped with a power air compressor for tire inflation purposes and to supply the air pressure for the water system and for the gasoline stove fuel supply. An auxiliary hand pump system is supplied for emergencies.

Underneath the car are located a 30-gallon gasoline tank for the engine, a seven-gallon gasoline tank for the stove and a 30-gallon tank for the drinking water system. The gasoline tank supply for the engine is taken care of by a vacuum feed system, not pressure. The ignition system of the car is entirely independent of all other electric wiring connections.

Nothing has been left out of the equipment of the car which would provide for the comfort and convenience of the owner and his guests. The car is being used now by Mr. Steedman and his family in touring Arizona and the southwest.

ADVICE FOR MOTORISTS GOING TO CANADA.

Automobilists going up the Maine coast to St. Andrews, St. John and the Maritime Provinces should cross the St. Croix river into New Brunswick at Calais to St. Stephen. The United States customs office is located at Calais, near the approach to the bridge. The Canadian customs office will be found at St. Stephen, immediately after crossing the bridge.

Motorists are cautioned to drive on the left side of the road immediately after crossing the bridge at Calais; this rule, following the British custom, must be observed at all times in New Brunswick.

To reach northern New Brunswick, Fredericton or Chatham on the Gulf of St. Lawrence, it is preferable to cross from Houlton, Aroostook county, Maine, to Woodstock. The American customs office will be found on the main street in Houlton and the Canadian customs at Richmond corner, on the road to Woodstock.

On going from Maine to Quebec via Jackman, the international boundary line is crossed 13 miles north of Jackman; the United States customs office is at the Jackman postoffice and the Canadian customs is located at Armstrong.

On the trunk line from New York to Montreal the United States customs is at Rouses Point and the Canadian customs at Lo Colle. At Niagara Falls the customs offices are at each end of the Suspension bridge. From Detroit motorists cross into Canada at Windsor.

FRED WELLMAN ADVERTISING MANAGER FOR NATIONAL MOTOR.

Fred Wellman has been appointed advertising manager of the National Motor Car and Vehicle Corporation, Indianapolis, to succeed Lucius French, who resigned to become secretary of the Western Oil Refining Co., also of Indianapolis. Mr. Wellman has been associated with Carl G. Fisher of Prest-O-Lite and Indianapolis Speedway fame for the last four or five years as advertising manager of various Fisher enterprises, chief among them being the creation of a fashionable winter resort at Miami Beach, Fla., now well on the way to success.

Through his connection with the Indianapolis Speedway and the Olds Motor Works, with which he was identified for a year prior to the return of W. C. Durant to control in the General Motors Corporation, Mr. Wellman is well known through the automobile industry, with many friends from coast to coast. He assumed his new duties Aug. 1.

CAR STOLEN IN LYNN, MASS.

A Cadillac 1917 seven-passenger touring car, maker's number 550,856, registered in Massachusetts, No. 123,327, was stolen while on Silsbee street, Lynn, July 28. J. M. Thompson, 49 Monument street, Swampscott, is the owner. The car was painted dark blue and equipped with Kelly-Springfield tires, with a spare tire on the rear.

Personal News of the Industry in Brief

George G. Bailey, for several years sales manager for the Brown-Lipe Co., Syracuse, N. Y., manufacturer of



George G. Bailey, Sales Manager, Hinkley Motors Corp., Detroit, Mich.

power transmission clutches and gear-sets for automobile vehicles, has resigned to become associated with the Hinkley Motors Corporation, Detroit, manufacturer of gasoline engines.

R. C. Getsinger has been appointed sales manager of the Lincoln Motor Co. and will assume his new duties about Sept. 1. The company was organized less than two years ago to build Liberty motors for the government. The organization is now being readjusted to manufacture and market a product which has been in development since the signing of the armistice.

Clarence A. Triphagen, formerly manager of the Reo factory branch at Lansing, Mich., is now manager of the factory branch at Detroit.

E. B. McCoy, who for two years has been advertising manager of the Olds Motor Works, is now head of the sales promotion department, which is a new division of the sales organization.

Walter C. White, vice president of the White Co., has been made a chevalier of the Legion of Honor by the French Republic. It was conferred in recognition of the services rendered to France by the White Co. during the war.

Lucius French, advertising manager of the National Motor Car and Vehicle Corporation, has resigned to become secretary of the Western Oil Refining Co., Indianapolis.

H. M. Bacon is now connected with the McGraw Tire and Rubber Co. as general sales manager, with headquarters in Cleveland. He had been with the Diamond Rubber Co. for eight years.

Mark Havenhill has become regional agricultural director for the southwestern territory of the Cleveland Tractor Co., Cleveland, O.

George Bell, formerly with the Remy Electric Co., as sales manager, is now assistant general manager of the Teagle Co., Cleveland, manufacturer of magnetos.

Ralph D. Webster has resigned as sales manager of the Wire Wheel Corporation of America to join the Fred E. Castle Co., distributor of Hayes wire wheels throughout the United States.

Earl W. McGookin has resigned as vice president of the Martin V. Kelly Co., Toledo and New York, to become a manufacturers' representative in Detroit. He will represent the Macbeth-Evans line of green visor lenses.

Otto T. Szekely has resigned as chief engineer of the Velie Motors Corporation, to become a consulting engineer, with headquarters in Rock Island, Ill.

F. George Walker is in charge of the New York office recently opened by the Fuller & Sons Manufacturing Co., Kalamazoo, Mich., to take care of the rapidly growing trade in the eastern district. The office is at 1834 Broadway.

A. L. Viles, formerly traffic manager of the Rubber Association of America, has become general manager of that organization, succeeding H. S. Vorhis.

James J. Harrington, formerly manager of the New England branch of the Ford Motor Co., has been promoted to take charge of the company's branch in Copenhagen. He was given a farewell dinner at the Boston City Club, at which he was presented with a diamond ring. R. P. Jones, formerly of Washington, is Mr. Harrington's successor.

Harold J. Vogler has been appointed general sales manager for the American Motor Truck Co., Newark, O. During the war he was an officer in the Ordnance



Harold J. Vogler, Sales Manager, American Motor Truck Co., Newark, O.

Department. Following the armistice he became general manager of the White service station at Philadelphia.

Homer L. Schneider has become a member of the truck sales department of the Grant Motor Corporation. Mr.



Homer L. Schneider, Western Salesman, Grant Motor Car Corp., Cleveland, O.

Schneider was for four years manager of the Republic Motor Sales Co., Cleveland, and prior to that was associated with Van Dorn Electric Co. for several years.

D. H. Torrey, sales manager of the Bearings Service Co., has finished his tour of inspection of eastern branches with his visit to Boston, and he complimented L. H. Dodd on the manner in which the business has increased and the improvement in the service.

Herbert L. Boehm, formerly connected with the Hudson Motor Car Co. of New York, is now with the investment securities house of E. H. Clarke, Inc., 27 Williams street, New York.

Col. Fred Glover, formerly chief of the motors division of the War Department, has become assistant general manager of the Timken-Detroit Axle Co. Before entering war work he was vice president of the Emerson-Brantingham Co., Minneapolis.

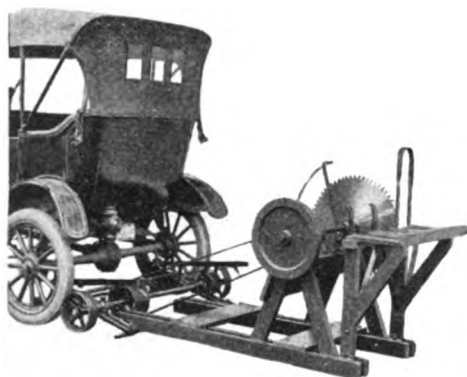
Ralph B. Dort, recently discharged from the Marine Corps, has been appointed by the Dort Motor Car Co. as director of sales for Europe.

Fred C. Cole, Jr., has formed a company to handle United States trucks in New York and Connecticut. P. B. Haynes is secretary and general manager. Offices are at 236 West 54th street, New York.

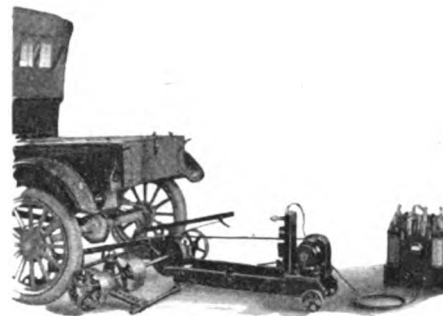
Earl J. Moon has been elected vice president of the Moon Motor Car Co., St. Louis. He is the son of the late Joseph W. Moon, founder of the company, and is a graduate of Princeton.

Byron H. Riess is now associated with the Charles E. Riess Co. in the wholesale distribution of the Columbia car at 1737 Broadway, New York.

INGENIOUS DEVICES FOR MAKING USE OF THE POWER OF FORD ENGINES



Showing the Lay Porta Power Running a Circular Wood Saw.



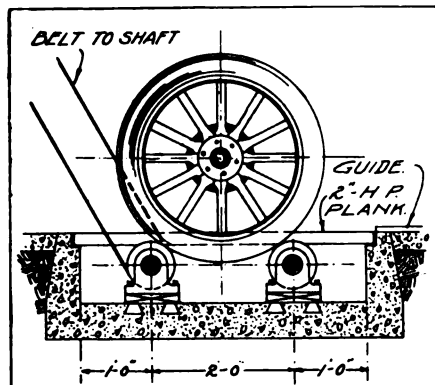
Lay Porta Power Running a Small Electric Light Plant.

MANY devices have been constructed to make use of power of engines of Ford cars for driving machinery. All may be practical, but some are better adapted to the work than others. The better types of these devices are installed at the front of the engines, having take-offs or transmitters that are firmly attached to the frame of the car. These have only been built for Ford cars, but the manufacturers state they intend to build them for use on other cars as soon as the patterns and castings are made.

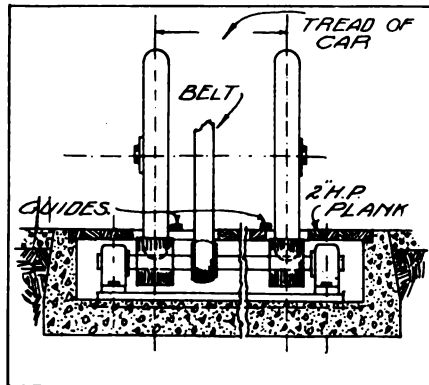
This type of transmitter power is directly connected to the crankshaft of the engine by a coupling that remains permanently on the crankshaft. The drive is through bevel gears and a shaft to a pulley, from which a belt may be run to the outside machinery. In the case containing the bevel gears and drive shaft is a centrifugal ball governor which limits the engine to a predetermined speed operating on the throttle of the engine. The bearings are phosphor bronze and are renewable when worn. Lubrication is by an oil tight case in which the gears and bearings run in a bath of oil.

The starting crank is placed further ahead and on the transmitter case. The equipment also includes a double-bladed fan which the manufacturer claims will fully cool the engine while working.

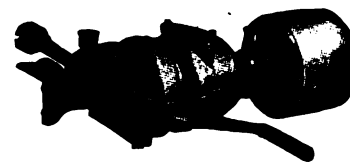
Claim is made the outfit will deliver an average of eight horsepower at the pul-



End View of Pit and Arrangement of Pulleys and Shafting for Home Made Power Plant Using Ford Motor for Power.



Side View of Pit and Arrangement of Pulleys for Home Made Power Plant Using Ford Rear Wheel for Power.



Andrew Auto Power Transmitter.

was placed on the rim of the wheel instead of on a pulley for driving an ensilage cutter. The power was taken from a small truck and after using it for a short time the truck was taken to a repair shop and new differential gears were put in. The cause was that all the strain of driving was thrown onto one wheel and one side of the differential gearset. As the differential gearset was built with four small pinions and two larger gears, the wear was necessarily very great on the pinions. This drive is not recommended for the above reason.

A home-made transmitter has come to the writer's attention and the owner claims that he operates a small shop with power from his car. When not in use on the road the car is backed into a shed adjoining the shop, at the back end of which a concrete pit has been made. In this pit are two short lengths of shafting supported by suitable bearings, the shafting being spaced about 24 inches apart. The front shaft carries a pulley at each end to engage the faces of the wheel tires. The rear shaft carries the two pulleys for engaging the wheel tires and a pulley for running a belt to a line shaft in the shop. Slots are cut in the floor so that the car may be backed into them, the wheels engaging the pulleys of the power transmitter.

The wheels are held in place by the weight of the car and the width of the slots. The owner makes the suggestion that the car may be anchored at the sides to keep the tires from working against the slots, but if flat faced pulleys perfectly leveled are used he claims little trouble will be experienced. Hard wood blocks placed under the pillow blocks of the bearings serve as cushion.

WALTHAM WATCH CO. INCREASES WAGES OF EMPLOYEES.

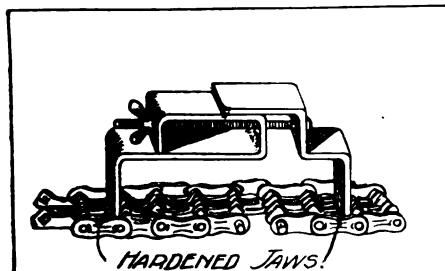
At its inception the Waltham Watch Co. adopted "Quality" as its foreword, and during the 75 years of its existence has maintained the highest standard.

Realizing that this could not be done without the cooperation of its employees, it has at all times endeavored to make working conditions above all criticism. The mental attitude of those engaged in the manufacture of a watch is reflected in the product of their labor, and the employee whose mind is engaged on how he or she will meet "the high cost of living" will not be the creator of a reliable time-piece.

With these thoughts in mind the Waltham Watch Co. has from time to time advanced wages during the past two years, and recently a notice was posted that all of the nearly 4800 employees would enjoy a further increase of 10 per cent.

Needless to say that the result of the announcement was received with pleasure.

MECHANICAL SUGGESTIONS AND HINTS FOR BENEFIT OF CAR OWNERS



Chain Tool.

CHAIN TOOL.

Removal or replacement of the lock link of motor chains, such as used for driving the generator, starting motor or camshafts, is facilitated by the use of a tool that will hold the chain together while doing the work. Such a tool comprises two steel hooks that may be caught into the links at each side of the lock link and contracted by a thumb screw and bolt. The steel jaws should be case hardened to insure durability.

SHOP KINKS.

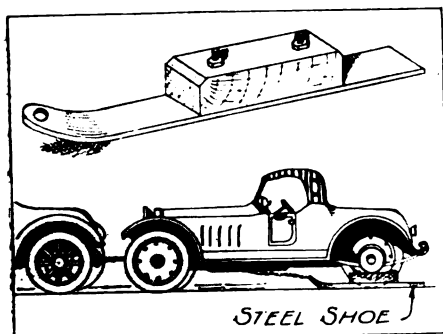
Vulcanizing cement that becomes thick through the evaporation of its solvents can be thinned to any consistency with gasoline.

Scraps of uncured rubber stock that accumulate about a vulcanizing department can be converted into a thoroughly satisfactory and high grade air drying rubber cement by placing them in a tightly covered container and pouring gasoline over them. Cutting the scraps of rubber in small pieces will hasten the dissolving of the rubber. A small quantity of alcohol may be added to reduce the dissolved rubber to a perfectly smooth mixture and insure against any tendency to lumpiness.

Small quantities of alcohol may be added to vulcanizing cement for the purpose of reducing lumps, but it should be used very sparingly as it has a tendency to cause blisters. Only uncured rubber can be dissolved.

TOWING SKID.

A simple steel sled, or skid, may be used instead of a towing truck to bring home the car having rear wheel broken.

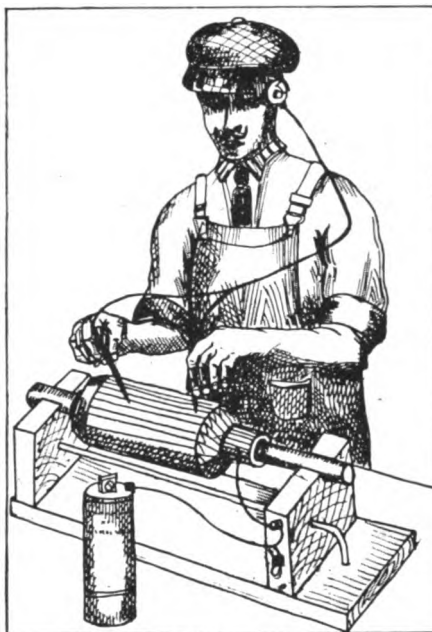


Towing Skid.

The skid comprises a wooden block mounted on a steel runner six inches wide and about 2½ feet long. The skid is placed beneath the brake drum of the broken wheel and held in place by a chain connected to the front spring shackle.

ARMATURE TESTING STAND.

This is an adjustable stand used in testing open or short circuits in an armature after it has been removed from the frame. It consists of two wooden rests notched to hold the armature shaft. One rest is adjustable and may be locked in any position, so that practically any arm-



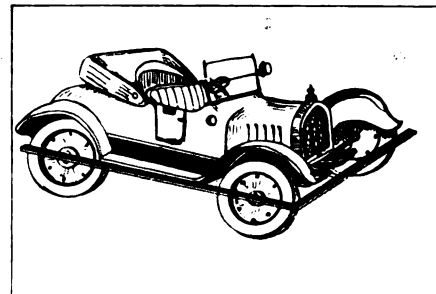
Armature Testing Stand.

ature may be accommodated. Attached to the binding posts on the sliding rest are two copper wire brushes, so bent that they rest on opposite sides of the commutator.

In making the test a single dry cell is attached to these binding posts. Leads are then taken from the telephone receiver and placed in rotation on adjacent bearings of the commutator, and the commutator slowly rotated. Absence of a buzzing sound indicates a short circuit; a large buzz indicates an open circuit. A three scale voltmeter could be used in a similar manner instead of the receiver. In the absence of a lathe these rests may be used as a support in refinishing the commutator surface, drive being effected through a belt placed over the armature winding.

LEATHER RENOVATORS.

A very satisfactory leather renovator may be made by darkening neatsfoot oil with ivory black. Applying this to the leather with a soft cloth and then pol-



Try-Square for Lining Wheels.

ishing dry serves to preserve the leather of the top or upholstery and give it pliability.

In respect to genuine mohair tops having an interlining of rubber, which all double fabric mohair tops have, the safe and sure renovating treatment consists of a brisk rubbing with a stiff broom, or a careful cleaning with castile soap and soft water, the condition of the top suggesting which of the two is best suited.

In any event the application of kerosene, gasoline or any petroleum by-products, or any oil of a similar nature, may be considered very detrimental to mohair tops and destructive to rubber interlining.

TRY-SQUARE FOR LINING WHEELS.

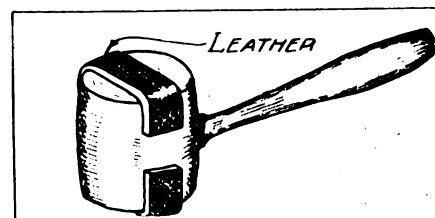
A large try-square is a simple tool for lining front and rear wheels. A piece of iron approximately ¼ inch by one inch by 16 feet long and another 5½ feet long are welded at right angles. With this device the rear and front wheels can be aligned; also the two front wheels and the two rear wheels.

TESTING VENT PIPES.

It is well in filling the radiator of a car to allow enough water to pass in to bring the level over the end of the vent pipe. If this pipe is clear, as it always should be, the fact will be indicated by the overflowing of the water through it. If it is not clear the water will overflow through the filter cap and not the vent pipe, and it should be attended to at once.

PROTECTED Mallet.

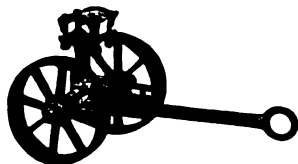
In straightening sheet metal parts, such as mud guards, aprons, etc., a wooden mallet is ordinarily used. In straightening sheet metal a heavy, tempered blow is required. That struck by a wooden mallet has the right quality, but is very liable to damage the finish. By fastening a thick piece of leather over the head of the mallet the force of the blow is softened, so that minor dents may be removed.



Protected Mallet.

ACCESSORIES DEPARTMENT

E & S Towing Truck. The E & S Towing Truck is an equipment for which the manufacturer makes broad claims. It is strongly made of the best of material and is very durable, having no working parts or joints to break or wear. Its simple construction makes it practically indestructible and it covers the entire range of tow-



ing truck service for handling all cars, large and small, from the front or rear.

The truck is equipped with 14-inch wheels, large enough to ride over car tracks and other obstructions, and it is made throughout from high grade malleable iron and steel. The wheels have four-inch tires, the tread is 18 inches and the weight is 160 pounds. The length of the handle or towing pole is 120 inches and there is a large ring welded to the towing end. The height adjustment is up to 18 inches.

The E & S Towing Truck is guaranteed to give perfect satisfaction and the jobber is authorized to accept the return of any that do not meet the approval of the purchaser.

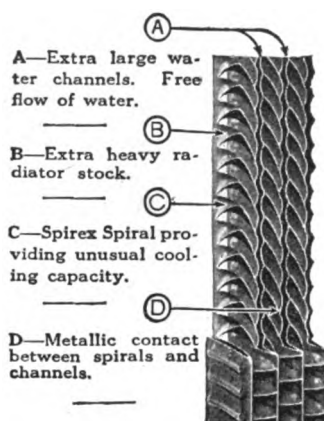
Manufactured by the Ellis-Smith Manufacturing Co., Inc., Buffalo, N. Y. List price, \$32.50. Discount to the trade.

Spirex Radiators for Ford Cars. Spirex radiators are the development of careful experimenting and research into the principles of heat diffusion and the correct application of the mechanics of design. After many tests for efficiency and cooling qualities they have been adopted as regular equipment by some of the leading manu-



facturers of cars, trucks and tractors. They are constructed to a design that is half honeycomb and half tube.

The illustration will best explain this construction. Large capacity insures a larger and better cooling system. It is the claim and guarantee of the manufacturer that a Spirex radiator has 42 per cent. more cooling capacity than the regular equipment of Ford cars and that the Spirex special radiators have 67 per cent. more cooling capacity.



Although each radiator is doubly tested at the factory, should a defect develop, due to workmanship or material, the factory will replace or repair the units provided it shall not have been damaged through misuse or accident.

Manufactured by the Modine Manufacturing Co., Racine, Wis. Radiators may be obtained for 1916 Fords or earlier or for 1917 or later. Prices, Spirex radiators for all Fords, \$28; Spirex special, \$33; f. o. b. Racine.

Cork Gaskets and Transmission Bands. The manufacturer of Acco Cork Composition makes many claims for this product, the base of which is ground cork, which is used for making gaskets of all kinds and descriptions for pulley covering or facing and for washers of various sizes.

Acco Cork Composition is a satisfactory material for use where the temperature does not exceed 212 degrees Fahrenheit. It is made of selected, clean, ground cork and a special non-hardening binder. This binder not only holds the cork together, but preserves its natural elasticity and prevents shrinkage.

Gaskets made of Acco Composition are not affected by oil, gasoline, grease or water and may be kept in contact with any of these liquids without disintegration. The elasticity of the cork is not only retained, but the process of manufacture tends to increase it. This is especially desirable where the surface is uneven and a gasket is to be used. In applying these gaskets it has been found among repairers that the best practise is



to coat one side with shellac and the other with graphite. By this method the gasket may be removed as often as desirable and will not be damaged.

The manufacturer claims that oil will not seep through cork gaskets. Acco Cork Composition may be purchased either in the finished gaskets, in sections

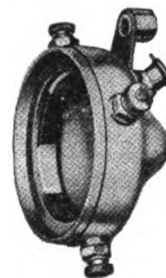


for inserting in transmission and brake bands, or in the roll or sheet form.

Manufactured by the Armstrong Cork Co., Pittsburgh, Pa. Prices and literature on application.

Milwaukee Timer for Ford Cars. The Milwaukee Timer for Ford cars is a very carefully made instrument. The case is a one-piece steel stamping, nickel plated over a coat of copper, making it rust proof.

A wide, deep bone fiber ring is fitted into the shell, providing perfect insulation, the contacts being imbedded in the fiber ring. The contacts are made of high grade cold rolled steel and are welded to screw studs, insuring perfect joints. The grooves are machine cut into the fiber ring, into which the contacts are carefully fitted. The manufacturer claims that by



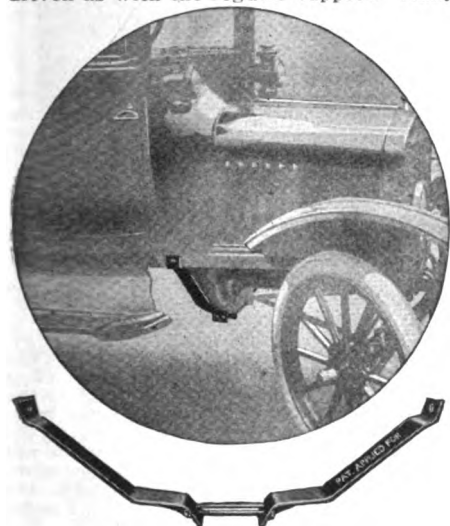
this method of construction the contacts are practically integral parts of the fiber ring, as it gives a solid backing and support on all sides, and that it is impossible for them to rock, shift or turn.

After fitting the entire surface of the fiber and contacts are carefully machined by boring and finishing operations, providing a perfect surface and a continuous, even bearing of the roller on the contacts. The roller is made of high carbon tool steel, machined, then hardened, ground and polished, making a perfectly smooth face. By this method of finishing and assembly the roller always bears squarely on the contacts.

Manufactured by the Milwaukee Auto Engine and Supply Co., Milwaukee, Wis. Price, \$2.

(When Writing to Advertisers, Please Mention the Automobile Journal.)

Simpson Crank Case Support for Fords. The Simpson crank case support consists of two short strips of steel, bolted together at the center and fastened at the ends to the frame by bolts. In case of a broken arm on the engine a Simpson crank case support may be put in place in a few moments time, and the engine driven as with the regular support. Many



Ford owners reinforce the regular arm with the Simpson crank case support and practically prevent an accident. This support may be installed, the manufacturer claims, in from 15 to 20 minutes.

Manufactured by the Simpson Garage and Machine Co., Newark, O. Price per set, \$2.

Defender Spring Shock Absorbers for Ford Cars. Defender spring shock absorbers are short springs of four leaves that are fastened to the ends of the regular Ford springs at the outer ends by clips fastened around the springs a short distance from the ends and at the wheel ends by suitable shackles.

The manufacturer claims that the absorber action is similar to that imparted by roller bearings and that the resiliency imparted to the springs is fully 50 per cent. more, and that tire mileage is greatly increased by their use. Rough roads may be driven on safely and 40 miles an

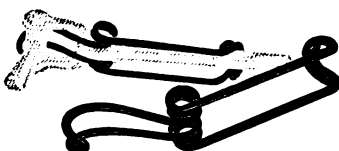


hour is not impossible by their use, as they facilitate steering, as the car will hold the road.

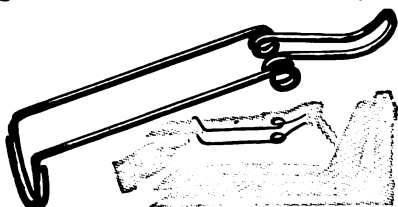
The Defender shock absorber is guaranteed never to tilt and to positively protect the car from shocks and rebound. It may be attached by any one in a few minutes time with simple tools. It has a handsome appearance when in place and requires no attention except to oil occasionally. Suitable for pleasure cars, sedans, coupes and trucks.

Manufactured by the Defender Auto Lock Co., Detroit, Mich. Sold through dealers only.

Fernald Steer-Aids and Little B-R-A-T-S. Fernald Steer-Aids and Little B-R-A-T-S for Ford cars are made from spring steel wire. The manufacturer claims that they will prevent all rattle and noise due to



wear at the ends of the front wheel tie rod and the emergency brake rods. Steer-Aids are placed one at each end of the tie rod and little B-R-A-T-S at each end of the emergency brake rod. They are put in place easily and any amount of driving will not throw them out. They may



be applied instantly without the use of tools. Steer-Aids and Little B-R-A-T-S are sold to the dealer in display cartons for counter sales that are efficient silent salesmen.

Manufactured by the Fernald Manufacturing Co., North East, Pa. Prices on application.

Barnstead Water Still. Battery service station repairers, garage owners and motorists can utilize the Barnstead Water Still, an apparatus with which distilled water may be made in quantity from any water supply by the use of steam, kerosene or electricity for heating the still.

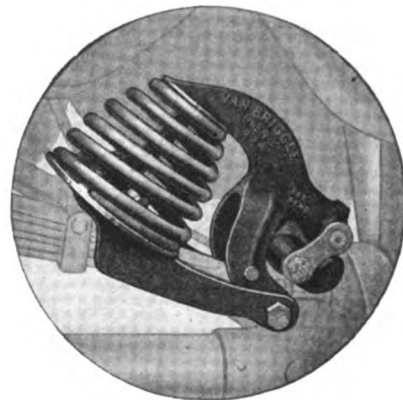
The manufacturer claims that the Barnstead Water Still can be installed at small cost and will deliver the purest of distilled water at one-half the cost per gallon of ordinary still operation; that



analysis proves that the highest degree of purity ever obtained (mineral matter one part to 1,000,000) by any process of distillation is reached with a Barnstead Water Still. The apparatus can be set up in small space, requires no attention while operating, is made of the best of material throughout and with ordinary care will last a life time. Barnstead stills are made in sizes to produce from one-half gallon an hour up.

Manufactured by the Barnstead Still and Sterilizer Co., 7 Lansville Terrace, Forest Hills, Boston, Mass., and 189 West Madison street, Chicago, Ill. Price, one-half gallon capacity, \$18.70.

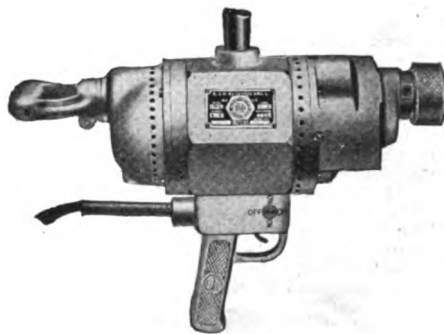
Van Biggle Shock Absorber. The Van Biggle Shock Absorber for Ford cars is a new device. The base of the absorber rests freely on the spring, allowing free action of the leaves and does not cramp or bind them. The arms of the base join the arms of the fulcrum lever and are fastened to the eyes of the spring ends by the usual spring bolt. The other section of the absorber is fastened to the clip on the axle, the same bolt being used.



In action, as the spring straightens from a shock, the arm of the absorber presses down the large coil spring and base, and on the rebound serves as a check. The manufacturer claims that this action thoroughly absorbs all road shocks and the car rides very easy.

Manufactured by the Van Biggle Motor Device Co., Indianapolis, Ind. Price, complete, cash with order, \$18 f. o. b.

Portable Electric Drill. This is a new drill with a capacity of 0 to 9/16 inch that will drill a 9/16 inch hole through machine steel at a rate of 1 1/4 inches a minute without overloading the motor, the manufacturer claims, which has been tested with pressures up to 500 pounds without stalling the drill. This drill is similar in construction to the other sizes. The housing is of magnalite, an aluminum alloy of great tensile strength. The gears are packed in grease in a separate grease-tight compartment similar to an automobile transmission gearset, the drill spindle running in a long bronze bushing and against a ball thrust bearing. The motor

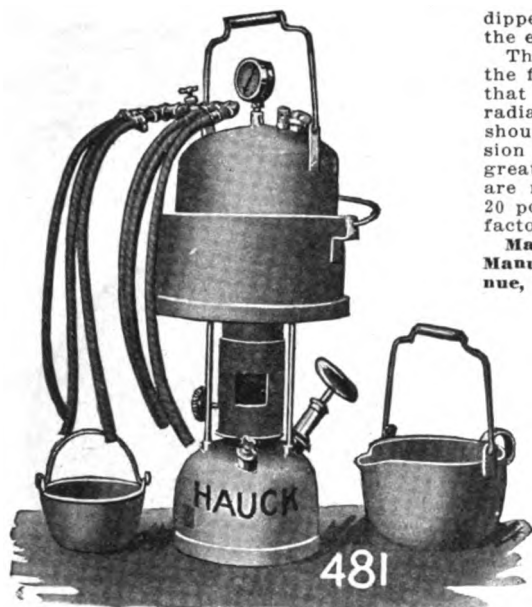


is air cooled and in testing these drills have been run continuously for 14 weeks, day and night, Sundays and holidays, stopping only to renew the brushes. The weight is 21 pounds and the load speed 600 revolutions a minute.

An interesting feature of this tool is the attachment for the Morse taper socket. This is a separable sleeve secured in the drill handle by a large knurled nut. By unscrewing this nut the entire taper socket may be removed from the spindle. This drill has the patented pistol grip and trigger switch, which characterizes all Black & Decker drills.

Manufactured by the Black & Decker Manufacturing Co., Baltimore, Md. The drill complete, with interchangeable spade handle and breast plate, 15 feet of Duplex electrical cable, separable plug attachment and detachable side handle, sells for \$96.

(When Writing to Advertisers, Please Mention the Automobile Journal.)



Hauck Storage Battery Outfit. The Hauck Storage Battery Outfit, burning kerosene, is designed to steam open storage batteries. While new it has proven very necessary in service stations handling storage batteries on a large scale. The manufacturer claims that the cost of operation is six cents an hour and that with it one can open 125 batteries a day, the average time required to generate steam being four minutes. A three or six-cell battery may be opened in from two to four minutes without damage to the plates.

The outfit consists of a 1½ gallons kerosene heated furnace with hand pump, a steam generator of 2½ gallons capacity, equipped with a gauge, safety valve, fittings, manifold and six 20-inch lengths of rubber steam hose, one melting kettle of 1½ gallons capacity for heating sealing compound, one lead melting pot of 35 pounds capacity and one mold for lead bars 15 inches long and 5/16 inch diameter.

Manufactured by the Hauck Manufacturing Co., 101-113 11th Street, Brooklyn, N. Y. Price, complete outfit, \$40; equipped with gas burner complete, \$30; one melting kettle, 1½ gallons capacity, \$2; one melting pot, 35 pounds capacity, \$1.50; one lead mold, \$1.50.

The Zig-Zag Honeycomb Radiators. Zig-Zag Honeycomb Radiators are built for pleasure cars, trucks and tractors, and the manufacturers make broad claims for efficiency. In construction they are a honeycomb type, with the sections arranged so that the flow of water has a zig-zag path from the top to the bottom.

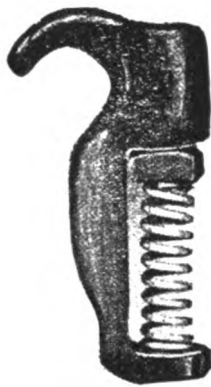
The tubes, after being formed, are assembled in the core by the convex parts, or offset of the tubes, fitting into the concave or grooved parts, and they are then



dipped in solder on both sides, sealing the edges of the metal.

This method of construction increases the flexibility of the tubes or passages so that expansion can take place should the radiator freeze. The same result follows should the radiator overheat, the expansion of the metal allowing the radiator greater cooling capacity. These radiators are made of brass and are tested under 20 pounds air pressure before leaving the factory.

Manufactured by the Auto Radiator Manufacturing Co., 1712-14 Michigan Avenue, Chicago, Ill. Prices on application.



Holton Hood Clips. Holton Hood Clips are manufactured for use on Chevrolet and Briscoe cars in the place of the clips usually fitted on these cars. The manufacturer claims that with these clips all hood rattle is prevented, besides having the added advantage of one being able to lift the hood easily when inspecting the engine. The clips are fitted to the car by removing the wing nuts of the regular fasteners and slipping the Holton fasteners over the bolts and turning them until the proper tension is reached. It is claimed that the fasteners will never slip or rattle.

Manufactured by the Holton Hood Clip Co., 205 10th Avenue, W., Calgary, Alta. Price on request. Finished in nickel and furnished in sets of four.

The McCulloch Timer Grinder. The McCulloch Timer Grinder is a bench machine for grinding the contacts of Ford timers absolutely true. The machine is fitted with a special chuck that requires no



skill whatever in centering; the grinding stone revolves inside the timer at high speed and the chuck and timer very slowly revolve around the stone. It is fitted with a very accurate adjustment and the manufacturer claims that the oldest and most worn timer may be ground with a surface like glass and equal to new in from two to three minutes. The whole machine is substantially constructed, all gears being cut from solid steel bar and lubricators fitted to all moving parts. When not in use as a timer grinder the chuck may be instantly removed, a large wheel fitted in its place and the machine can be used for grinding tools, twist drills, etc. It has been well tried out and has proved very satisfactory in every way.

Manufactured by the A. P. McCulloch Machine Co., 216 High Street, Boston, Mass. Prices on application.



The Fenster Foot Accelerator. The Fenster Foot Accelerator consists of a pedal hinged to a standard fastened to the floor of the car, the edge of the pedal resting upon the accelerator. A spring in the standard returns it to position when not in use. In operation a slight pressure sideways on the pedal will operate the accelerator. A lip on the side of the pedal prevents the foot sliding sideways. The manufacturer's claims are substantiated by statements of owners. Leg weariness is not experienced and more even operating of the engine, both on rough roads and pavings, is also realized.

The Fenster Foot Accelerator is made of the best materials and will not rattle or break. It is guaranteed for the life of the car and after trial if the buyer is not satisfied the purchase price will be refunded. It is adapted to practically all makes of cars, but especially those having the accelerator at one side of the brake pedal.

Manufactured by Peter Gray & Sons, Inc., Cambridge "C," Boston, Mass.

Kor-Ker. Kor-Ker is a mineral compound, a clean, dry powder which, when mixed with pure water to about the consistency of an emulsion, is injected into the tire tube through the valve. The water is a binder of the mineral ingredients which form a perfect air-tight plug when forced by air pressure from the tube into a puncture. There is no chemical action.

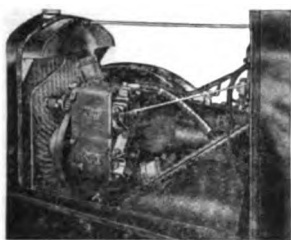
The manufacturer claims that Kor-Ker will seal punctures or porous openings in a tube while the car is in motion on the road and that this action will take place without the driver of the car knowing it. This particularly applies to punctures up to the size of a tenpenny nail.

It contains a preservative that keeps tubes elastic and prevents the rubber of the tubes from drying. Kor-Ker contains no substance that will eventually fill the valve stem and prevent it operating the manufacturer claims. Tubes filled with Kor-Ker may be as readily vulcanized as tubes that have not been so treated, as there is no adhesion of the compound to the rubber surface, and Kor-Ker falls to the bottom of the tube when not in use.

Manufactured by the Alcemo Manufacturing Co., Newark, N. J. Size No. 1, for four three-inch or 3½-inch tires, \$8; No. 2, four four-inch or 4½-inch tires, \$10; No. 3, four five or 5½-inch tires, \$14.



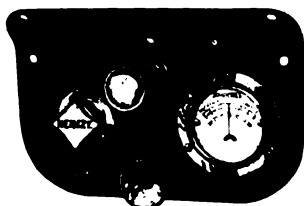
(When Writing to Advertisers, Please Mention the Automobile Journal.)



Heinze-Springfield Electric Starting and Lighting System for Ford Cars. The Heinze-Springfield electric starting and lighting system for Ford cars consists of a two-unit, six-volt, single wire equipment with Bendix drive. It is interchangeable on both old and new types of Ford engines.

The manufacturer claims that this starter insures a surplus of power for starting and a generator output sufficiently high to keep the battery fully charged and in good condition.

This outfit eliminates the dangers of hand cranking and stalling in traffic. The engine is always locked when the car is left for any length of time and steady lights are provided for night driving. The control is from the dash on which is lo-



ated the ammeter, dash light switch and lock. It can be easily placed on the front of the engine by using a special cast mounting plate and fittings furnished with the starter. The system is complete as sent out by the manufacturer and no extras are required.

Manufactured by the John O. Heinze Co., Springfield, O. Prices and literature on application.

Kewanee Motor Generator Sets. Kewanee Motor Generator Sets are manufactured in many sizes and capacities and are suitable for all classes of charging work from the private owner having one battery to charge occasionally to the service station where many batteries are overhauled and charged daily.

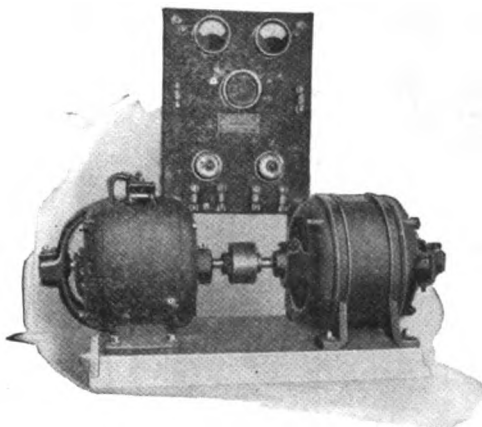
The outfits include beside the motor generator a suitable panel of slate upon which is placed the instruments used for charging. Among these instruments are a generator field rheostat, voltmeter, ammeter, motor and generator circuit control switches, fuses, ammeter reading switches, battery circuit switches and charging rheostats; also a circuit breaker when ordered. The regular equipment consists of a two-circuit panel, including instruments and switches as specified, with charging rheostat in one circuit. Additional circuits, circuit breaker and charging rheostats are furnished at extra prices. The voltmeter reads the voltage of the generator circuit only.

The generator is shunt wound, its voltage increasing as the batteries approach the charged condition and the ampere load decreasing, thus permitting the long low rate charge necessary for the life of the batteries.

The motor generator sets are made from the best materials, guaranteed by the manufacturer, and may be operated either on single or double phase circuits alternating current. These outfits will charge from one to six six-volt batteries in series, or double this number in multiple in the smaller sizes, and in the larger outfits will charge from four to 13 six-volt batteries in series or double this number in multiple, with the amperage for charging varying from six to 37½. The point that recommends these outfits is the fact

that experienced men are not required for their operation, the regular garage or service station help being sufficient.

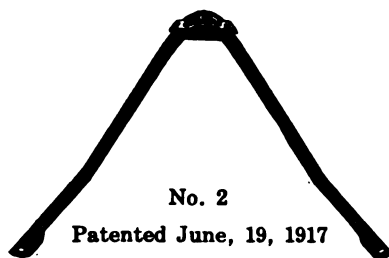
The same company manufactures a direct connected pump and electric plant for isolated service stations where electric current is not available, for which it makes many claims. This outfit will supply the necessary electric current for use about a shop for lights and small motors and also pump the necessary water to a pneumatic storage tank, either from a deep or shallow well. The pump and electric light plant may be used together or



separate as required. Power is obtained from a gasoline engine, direct connected to the dynamo and pump. A button on the switchboard starts the engine and the engine is automatically stopped when either the tank is filled or the storage batteries in connection with the outfit have reached their maximum charge.

Manufactured by the Kewanee Private Utilities Co., Kewanee, Ill. Prices and literature on application.

Radius Rod Supports for Ford Cars. Radius rod supports for Ford cars are made from angle steel and shaped to fit either beneath radius rods or inside of them. The No. 2 support is the most used because of its position when in place, as it is fitted directly in the crotch of the radius rod. In the event of the loss of the clamp or bolt there is a support for the front axle, and there are no strains on the bolt or clamp. The support is so formed at the crotch into a clamp that

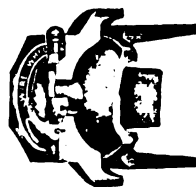
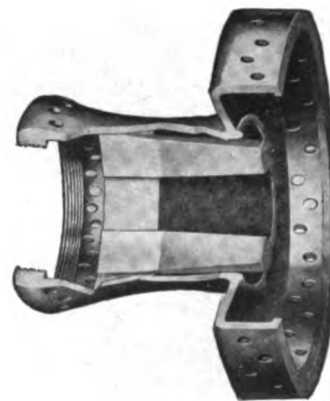


cannot be moved by pressure from its position, as the top web of the angle is formed at the crotch that when placed it hugs the radius rod its full length. The manufacturer claims that the clamp may be removed from the support and the car driven without danger of accident.

Manufactured by the Brocksmith Manufacturing Co., St. Louis, Mo. Prices on application.

Stewart Wire Wheels for Passenger Cars. Stewart Wire Wheels for Passenger Cars while new to the trade are the product of a concern that has long been connected with the automobile industry.

In the newly perfected Stewart wheel, all danger of wheels accidentally coming off is obviated the manufacturer claims. The inner hub and outer hub each have four reverse tapers. As the outer hub is applied the tapers slip into grooves and a one-eighth turn locks the reverse tapers of the outer hub to those of the inner.



Each taper has bearing on the entire surface of the other. Even when the tapers begin to wear perfect bearing surface is maintained until both reverse tapers are entirely worn away is claimed. Until the reverse tapers are thus automatically locked the hub cap cannot be applied. Inside this hub cap is swiveled a wedge key with four tapered wedges. This wedge key has two functions. It carries the wedges for securing the wheel upon its taper bearings, at the same time the end of the inner hub projects into the wedge key, which in turn seats in the recess of the hub shell, thus affording a positive, direct drive combined with rigidity of wedge bearings. Turning the hub cap forces the wedges home and they are held by an automatic spring lock ratchet mechanism. Two or three final turns with a hub wrench make the hub cap absolutely tight, and the spring lock prevents its working loose.

Manufactured by the Stewart Wire Wheel Corporation, Frankfort, Ind. Prices and literature on application.

Gemco Universal Valve Spring Release. Garage and service station repairers will be interested in the Gemco Universal Valve Spring Release No. 202. By its use obstinate valve springs may be compressed and the pins removed to take out the valves for grinding.

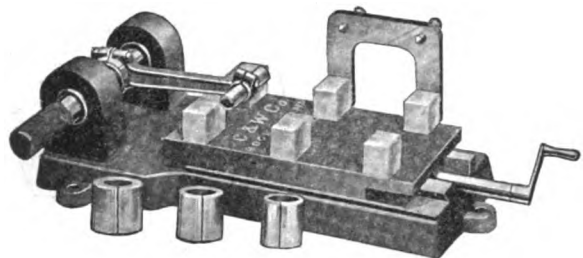
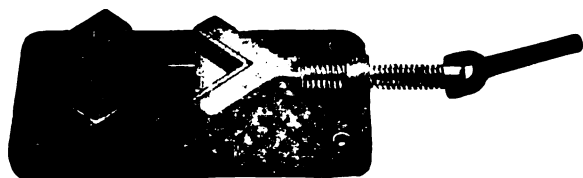
It consists of two arms forked at one end and hinged to a cross member at the other. A bolt carrying a winged nut at one end passes through the center of the cross member and fits against a block



slidable between the two hinged arms. When operating the forks are placed one under the valve spring and the other over the push rod, and they are forced apart by the bolt and block, the block bearing against the sides of the arms. When the spring is compressed it is held so that the pin may be easily removed, and the valve can be taken out. By turning the bolt in the opposite direction the tool may be released for use on the next valve. The tool is made throughout of the best of material and the manufacturer claims that it will last for years.

Manufactured by the Gemco Manufacturing Co., Milwaukee, Wis. Prices on application. Sold through the jobbing trade.

(When Writing to Advertisers, Please Mention the Automobile Journal.)



Connecting Rod Aligner and Piston Clamp. Two tools of unusual interest to the service station and garage owners are the connecting rod aligner and piston clamp manufactured by Campbell & Wochner. These are bench tools that may be placed conveniently for work and will earn the investment in them many times over during the course of a year. The aligner not only proves connecting rod alignment, but also the cross diameters of the pistons. With it one can check the positions of the connecting rods, that is, the tops of the rods on the wristpins between the piston bosses. The manufacturer claims that with aligner connecting rods all makes can be aligned quickly and accurately.

The piston vise or clamp is adjustable and will hold any piston from 2 3/4 to 4 1/2 inches. It is impossible to crack the skirt of a piston or to damage the rings in any manner. The machine is indestructible and when reaming for oversize pins or installing new bushings in a piston will prove indispensable.

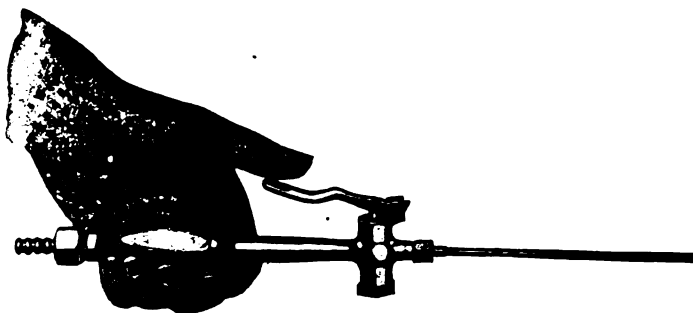
Manufactured by the Campbell & Wochner Co., 1611-15 Third Ave., Rock Island, Ill. Prices: Piston clamp, \$8; aligner, \$65. F. O. B. These are fully guaranteed.

Rees Double Worm Gear Drive Jacks. The principle of the worm gear is employed in the construction of Rees' Double Worm Gear Jacks, which are claimed to be very powerful in operation. These jacks should be used generally in garages and service stations because of their power for lifting qualities, the ease of



placing them beneath the axles and the fact that they may be operated from a standing position. They are manufactured in a variety of sizes and weights and for all classes of work, both light and heavy. The manufacturer claims that a child can lift a two-ton load with ease with one of these jacks and that the jack cannot drop while under load.

Manufactured by the Iron City Products Co., 7501 Thomas Boulevard, Pittsburgh, Pa. Price, passenger car model, \$9.



Atlantic Pneumatic Grease Gun. The Atlantic Pneumatic Grease Gun is designed to move grease by compressed air from a tube by pressing a button. Air is supplied from an engine driven tire pump, foot pump, compressed air system or from an inflated tire on the machine. To operate, attach the hose to the valve connection on the pump. Fill the pump with grease, using filler provided for that purpose.

To use with inflated tire, reverse the hole ends to compress the valve inside of the valve stem. By pressing the button on the pump the grease will be forced through the nozzle. When the pressure on the button is released the grease stops flowing instantly. A small screw is supplied for use with a compressed air system or air from an inflated tire, but it must be removed when used with a power pump, as the opening where the screw is placed is the safety valve for the air when not forcing out grease. The safety valve is provided in the plunger so that when the gun is empty air will pass through the gun and out through the nozzle, preventing the air from backing up and bursting the tire pump. A small opening in the barrel of the gun allows the air behind the piston to escape when the gun is not in operation, so that the grease will not be forced out. Any grade of grease may be used, the flow being determined by the pressure of the air supply. The gun is nearly all brass, is nickel plated and holds 16 ounces of grease. The outfit includes the grease gun, two tips, 1/4 inch and 3/8 inch, of iron to be inserted in place of grease cups to clean out a stopped joint, one flexible metal hose for end or cap with union, filler with paddle, one plug for inserting in the nozzle end of gun when carrying it filled in the tool kit. Packed in a wooden box.

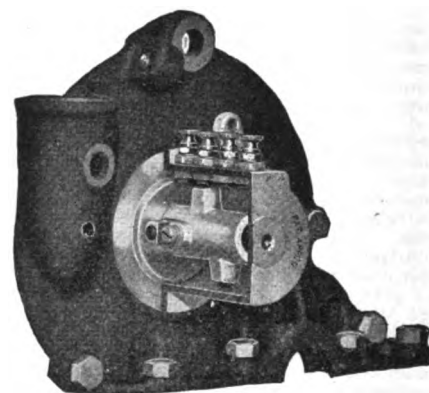
Manufactured by the Atlantic Motor & Supply Co., 63 Gorham St., West Somerville, Mass. Prices on application.

Fidelity "One Hand Torch." The Fidelity "One Hand Torch" No. 19-A is a late model handle for the garage repairer doing decarbonizing work. It consists of a

handle with a suitable grip and shut off valve operating on the oxygen supply within easy reach of the thumb. The tip on the end for insertion into the combustion chamber of the engine is made detachable, as these burn off occasionally and must be replaced. With this 20-inch semi-flexible copper torch head the tool can be extended into every part of the chamber. The "one hand" operation is a big feature. The automatic shut off valve controlling the oxygen supply is located on top of the torch, coming right under thumb of the hand holding it. A slight pressure of the thumb on the valve handle turns on the oxygen and releasing the pressure automatically causes complete shut off. New tips can be obtained quickly and at small cost from the manufacturer.

Manufactured by the Fidelity Brass Manufacturing Co., 1001-1011 West Washington St., Chicago, Ill. Price for the outfit, including torch, 50 pound gauge and six feet highest grade hose with clamps, \$17.50.

The Jack Rabbit Distributor for Ford Cars. The Jack Rabbit distributor is designed to take the place of the regular Ford commutator. Unlike the Ford commutator there is nothing about the contacts to wear as its brush units break contact while traveling through space. The terminal contacts are a suspended type, attached to the top of the distributor. The wire connections are from the top of the distributor directly over the brush contacts, insuring against accumulations of oil. Jack Rabbit distributors can be easily attached to any Ford car by installing it in place of the old commutator and connecting the wires to the terminals marked one, two, three and four. Then turn the engine over until the old roller brush points down; remove it and with the engine in this position slip the



Jack Rabbit brush on the camshaft and tighten set screw securely into hole on the camshaft. Use the bolt and bushing furnished for adjusting the Jack Rabbit body to the engine. If the spark is timed too low this may be corrected by shortening the spark rod by bending.

The manufacturer claims that by the use of the Jack Rabbit distributor the wires will be kept free from oil and ignition troubles will be reduced.

Manufactured by Jack Rabbit Ignition Co., 1062 Palmer Avenue, Detroit, Mich. Price, \$5.

(When Writing to Advertisers, Please Mention the Automobile Journal.)

FEATURES FOR THE WOMAN MOTORIST

Cleansing Creams are Used for Removing Travel Stains

The soap and water method to cleanse the face has been abandoned by many women who tour in favor of a more satisfactory and equally sanitary way, by the use of cleansing creams and other lotions.

It has been found that when traveling from city to city nothing is more injurious to the skin than the constant changing of the qualities and properties of waters.

The effect of hard water particularly is to chap the skin and coarsen the pores. The woman tourist nowadays begins the day with a cream rub and then applies a vanishing cream, which is entirely smoothed over the entire face and neck, which must be protected from wind and dust.

She puts on a fresh veil every day, as she realizes that a dust laden veil works injury to the complexion of itself. At the close of the day milady adopts a good way to overcome the trip's ill effects on one's face by using first some cleansing cream.

The old idea was to massage the cream into the pores of the skin, but latterly it has been learned that this tends to produce wrinkles and that it is far more conducive to good results to pat the cream into the face. She does this rapidly with the tips of the fingers, the tapping stimulating circulation, which strengthens the tissues.

After the cream has been on the face 10 or 15 minutes she gently removes with a Japanese tissue. She next applies the astringent with a piece of cotton. When the astringent has fully dried into the skin she wraps a piece of ice in cotton and rubs it carefully all over the face until it glows.

The woman tourist also appreciates that one must not neglect the eyes. Surely if one's face feels full of fine particles of dust, it follows that the eyes have retained an undue portion of the dust of the road. Milady washes them carefully with a good eye lotion and then massages under the eyes with cold cream.

"TAMING OF THE AUTO."

"The Taming of the Auto' is not the name of a new Broadway success, but rather indicates the latest role in which we find the women of today," states an announcement of the Apperson Bros. Automobile Co. "In these days when we hear so much of woman's suffrage and other important economic matters into which the American woman is finally, with right, coming into her own, it is interesting to note the place she today occupies, insofar as the automobile is concerned.

Printzess Model For Motor Wear In Fall



The motorist finds both protection and warmth in this well-cut Printzess model, which is one of the newest of the new. Its trimming is of self-material and a chief feature is the smart collar, which is ideally protective. The cuff and sash ends tying at the front, are distinctive and exclusive features.

(Courtesy Printz-Biederman Co., Cleveland, O.)

"Perhaps no phase of the motor industry has been more exploited or fraught with more importance to the social life of the nation than this 'taming of the auto.' It is neither fair nor ethical, to assert that the modern automobile is so thoroughly simple in its control and ease of driving that a child can, without difficulty, learn to run it. However, it is a truism worthy of deep masculine reflection that milady has made it her business to master the driving of a car."

In this particular regard the Appersons assert that they are marketing a machine which has had a great deal to do with the final success of the woman driver. Some of the reasons stated are:

Most Graceful Woman Auto Driver in Middle West

To Miss Margaret O'Brien, Columbus, O., goes the distinction of being the most graceful woman motor car driver in the middle west. She won the coveted honor in a style driving contest conducted recently at the Columbus Driving Park.

Driving her Peerless Two Power Range Eight, she qualified for the sectional contests by winning the all-Ohio championship. With the state title she received a silver cup, presented by the Chamber of Commerce, the Manufacturers and Jobbers' Association and the Retail Merchants' Association of Columbus, and the gold medal offered by the directors of the Columbus Driving Park.

A week later, in competition with Miss Mary von Mach, Detroit, and Miss Clariss Davis, Windsor, Can., who also had qualified for the sectional finals, Miss O'Brien again demonstrated her driving prowess at the wheel of the Peerless Two Power Ranger. The graceful manner in which she executed the "figure eight" backward practically decided the contest in her favor. Miss Davis was second and Miss von Mach third.

LEATHER COATS FOR FALL.

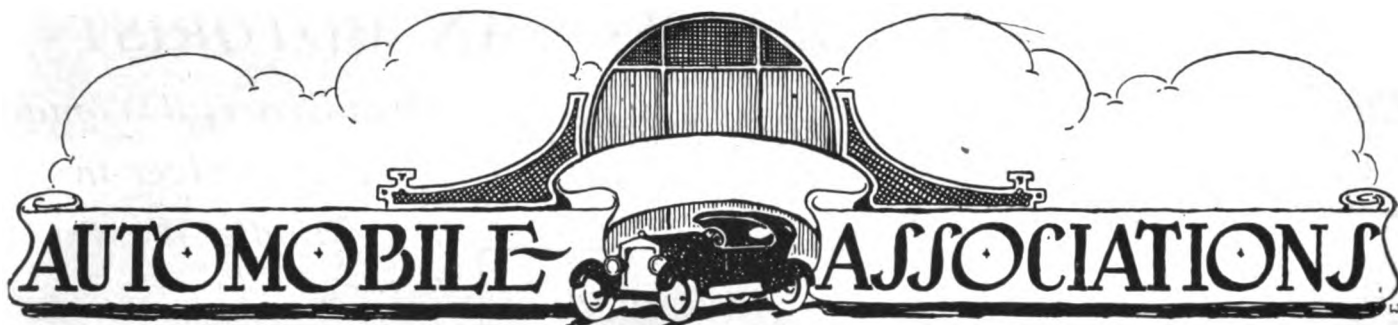
Among the most fascinating garments seen for motoring for the coming fall are the new leather and leatherette coats. These have been made soft and pliable and are very comfortable.

There was a time when the leather garments for women were so heavy and clumsy that they did not appeal to the motoring woman, but this objection has been overcome. The new styles are not only smart in appearance, but are also waterproof, warm and comfortable. Few women motorists will be without them this fall.

COLOR OF PLATES.

(Continued from Page 23.)

New Hampshire—Black on white.
New Jersey—White on French gray.
New Mexico—Black on white.
New York—White on black.
Ohio—White on dark maroon.
Oregon—Black on orange.
Pennsylvania—Red on black.
Rhode Island—Black on white.
South Carolina—Dark blue on white.
Tennessee—White on dark blue.
Texas—White on black.
Utah—White on dark green.
Vermont—Blue on buff.
Virginia—White on black.
Washington—Black and yellow.
West Virginia—Black on white.
Wisconsin—Bright yellow on dark green.
Wyoming—Black on light green.



State Troopers Enter Headlight Campaign

Henry McNair, chairman of the board of the New York Automobile Club, has issued a warning to the members of the club to provide themselves at once with approved lenses, and offers to supply free of charge a list of approved lights. The automobile law of New York state requires one of a number of kinds of headlights that have been approved by the secretary of state. Offenders who use dazzling lights are to be rounded up by the New York state troopers. All principal highways are to be patrolled in the campaign.

CLUB IN CANTON, N. Y.

A new automobile club, really a reorganization of the old one, was formed recently in Canton, N. Y., with the election of these officers: President, J. W. Benton; vice president, Dr. F. F. Williams; secretary and treasurer, G. A. Manley. Membership dues will be \$5 a year. Residents of the vicinity of Canton will be eligible. The former club had a membership in Dekalb, Harmon, Russell, Crary Mills, Morley and Rensselaer Falls, and it is believed that these places will be largely interested in a central organization at Canton, possibly forming local committees to work with the general committees of the club.

PENNSYLVANIA TOUR CARD.

The Wilkes-Barre Automobile Club has issued a tour card covering north-eastern Pennsylvania, showing routes to Delaware Water Gap, the Pocono Mountains, Wyoming Valley, Gettysburg and many other places. Peter G. Rimmer, president of the club, will supply motorists preparing to tour there with copies on application.

FLINTSTONE, MD., AUTO CLUB.

A new automobile club has been organized at Flintstone, Md., 12 miles east of Cumberland on the National Pike. Joseph H. Reinhart, Cumberland, is treasurer. A dining room, a swimming pool, a baseball diamond and tennis courts will be among the features. Membership will be limited to 250 with an annual fee of \$18.

DIXIE HIGHWAY.

William E. Metzger, director and former president of the Detroit Automobile

Club, who has been active in the general effort to complete the Dixie Highway, has been notified by V. D. L. Robinson, secretary of the Dixie Highway Association, Chattanooga, Tenn., that the division through eastern Kentucky and Tennessee via Cumberland Gap, as well as the western division, from Nashville to Chattanooga, will be completed within a year. Steps are being taken to assure the new division through North Carolina in the vicinity of Asheville.

MINNEAPOLIS CLUB OPENED.

The new home of the Automobile Club of Minneapolis has been formally opened. It is located at Bloomington-on-the-Minnesota, and its total cost, including furnishings, is about \$75,000. The old club was burned in August, 1918. The insurance amounted to \$19,000, and to this there was added \$50,000 from a bond sale, also current funds. The building committee consisted of H. J. Clark, George K. Belden and O. E. Deckert.

LACKAWANNA COUNTY CLUB.

The Motor Club of Lackawanna County, Pa., proposes to keep the public informed as to road conditions and existing laws. The organization is affiliated with the American Automobile Association and the Pennsylvania Motor Federation. The membership fee is \$5. The club is working for better roads for the county.

MORGAN TOURING EAST.

E. B. Morgan, member of the Denver Motor Club, was a recent visitor at the rooms of the Detroit Automobile Club. He has been making an extensive tour through the East and sought road information.

Motorists' League

A commercial branch of the League for Motorists' Protection has been organized for the purpose of admitting owners of motor trucks to membership. Harry W. Gaston, president of the league, says that chauffeurs operating trucks will not be eligible. Membership will be limited to the owner, who by joining shows his wish to restrain operators of other trucks from acts of recklessness and that he is willing to report violations. Mr. Gaston says that 7000 members have already joined the organization, the object of which is to war on the "Hun on the Road."

New Jersey Club Now Guiding Motorists

Saving residents from nightly annoyances of leaving their beds to direct motorists is one of the reasons why the sign posting car of the New Jersey Automobile and Motor Club generally is welcomed by persons living near cross roads in small towns all over the state. It was to end these nocturnal disturbances at the fork of the roads leading from Demarest that an S. O. S. (Save Our Sleep, presumably) call was sent to Theodore T. Maxfield, secretary of the automobile club and chairman of the sign posting committee. Secretary Maxfield was prompt to respond. The club announces that the road to Nyack from Demarest has just been resurfaced. The route is much used by motorists who cross the river by the Englewood ferry to Dyckman street, New York.

NEW MAP OF LONG ISLAND.

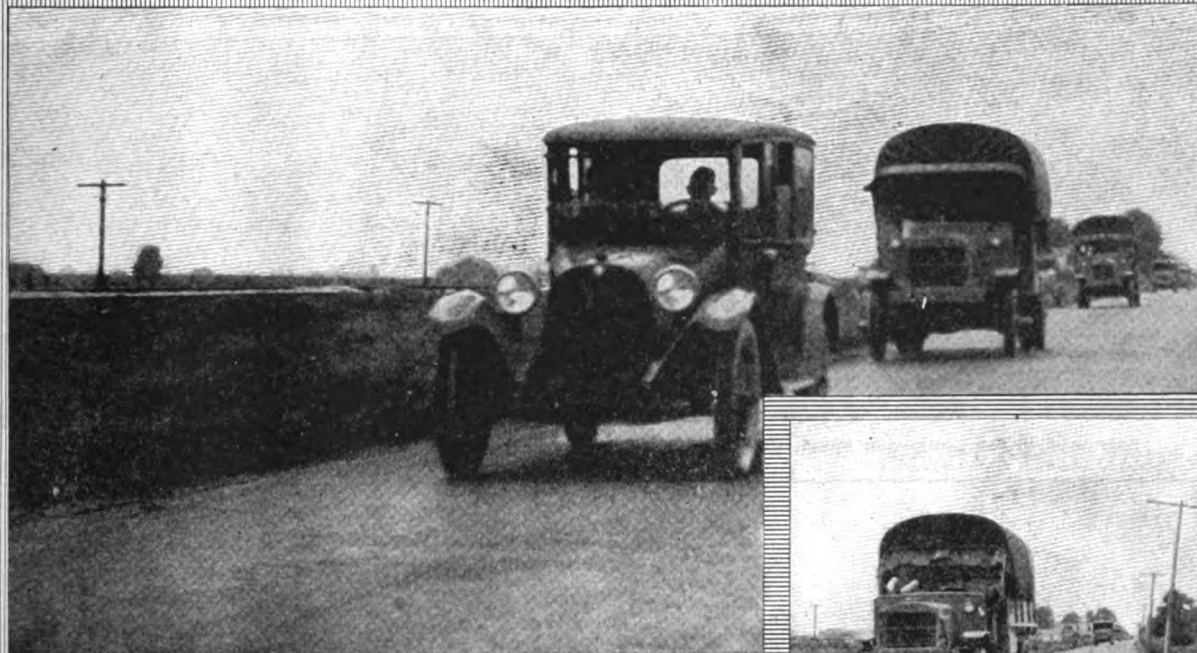
The New York Touring Bureau of the American Automobile Association has prepared a new map of Long Island for users of internal combustion engines both on the ground and in the air. This combination aviation-automobile map shows flying fields and landing places for aircraft and gives highways and railways in distinctive colors. Special needs of motorists are taken into consideration. For instance, for those interested in golf and yachting the location of every golf, country and yacht club on the island is indicated. Nearly 100 such clubs are marked on the map, with a special sign to make them stand out prominently. Other features which enhance the usefulness of the map for motoring purposes are the locations of all parks, cemeteries, race tracks, military reservations, prominent estates, ferries, bridges and landmarks at important road junctions. Copies of this may be obtained upon application to the A. A. A. headquarters, 501 Fifth avenue, New York.

COPY DETROIT CLUB'S PLAN.

The "Safety First" campaign fathered by the Detroit Automobile Club with the cooperation of the Detroit authorities, is to be copied in Kalamazoo, Mich.

Kalamazoo is the first city to follow Detroit in instituting this campaign, but, because of its great success in Detroit, it probably will be tried out in numerous other cities.

Motorists of Kalamazoo will cooperate in making it the success it deserves.



Rideout Road, Toledo, O. All during 1918 this road was traversed by Army trucks being driven to the Atlantic seaboard. Macadam road resurfaced with "Tarvia-X" in 1913 and treated with "Tarvia-B" in 1916 and 1918.



Total amount invested in this road for 18 years now saved every 10 months!

THIS is Wood County's heaviest travelled road. All automobiles and motor trucks in transit overland around the western end of Lake Erie from Detroit and Toledo to the East must drive over this highway. In fact, most of the overland motor traffic to the South also takes this route.

Mr. John F. Gallier, County Surveyor of Wood County, recently figured that this highway carries 2,000 tons per day for its entire length of 736 miles, or more than 5,330,000 ton-miles per year!

This road is a Tarviated highway, and in a very interesting article Mr. Gallier develops the fact that every ten months the saving in the cost of operating motor traffic over this highway, as compared with that on a well-drained clay road, equals the total investment in the road for the past eighteen years.

Space is too limited to give Mr. Gallier's figures in detail, but a copy of the article, which gives the history and maintenance figures of the road since 1900, will be sent to any interested road engineer or tax-payer upon request.

Briefly, the total investment in the road for 18 years, including three Tarvia treatments, is \$99,367.63, or a trifle

more than \$13,500 per mile.

Figuring carefully and conservatively, Mr. Gallier has worked out the difference in cost of gasoline, tires and oil alone (not taking into account the saving in wear and tear on automobiles and trucks), for traffic over the Tarvia road as compared with the same traffic over a well-drained clay road. Reduced to totals, the figures are:

Total average daily cost of gasoline, tires and oil for motor traffic on clay road..	\$714.62
Total average daily cost of gasoline, tires and oil for motor traffic on Tarvia road	381.73
Daily difference in favor of Tarvia road..	\$332.89
Difference for 365 days.....	\$121,475.85

This means a saving of \$10,122.98 per month, or \$101,229.80 every 10 months, which is more than the improved road cost to build and maintain for 18 years, including interest, engineering and drainage costs!

Tarvia is ready to serve other communities as it is serving this one, helping them to build and maintain mudless, dustless, automobile-proof roads at low cost—roads that pay for themselves—roads that are an asset instead of a liability.

Descriptive booklet telling all about this interesting proposition free on request.

Special Service Department

This company has a corps of trained engineers and chemists who have given years of study to modern road problems. The advice of these men may be had for the asking by any one interested. If you will write to the nearest office regarding road problems and conditions in your vicinity, the matter will have prompt attention.

Tarvia

Preserves Roads—Prevents Dust

THE BARRETT COMPANY, Limited:
New York
Cleveland
Birmingham
Seattle
Youngstown

Chicago
Cincinnati
Kansas City
Peoria
Toledo
Montreal

Philadelphia
Pittsburgh
Minneapolis
Atlanta
Columbus
Toronto

The Barrett Company
Duluth
Richmond
Winnipeg
Milwaukee
Latrobe
Vancouver
Dallas
Bangor
Bethlehem
St. John, N.B.

Boston
Detroit
Nashville
Washington
Elizabeth

St. Louis
New Orleans
Salt Lake City
Johnstown
Buffalo
Halifax, N.S.

TRADE MARK
B
Baltimore
Lebanon
Sydney, N.S.

(When Writing to Advertisers, Please Mention the Automobile Journal.)

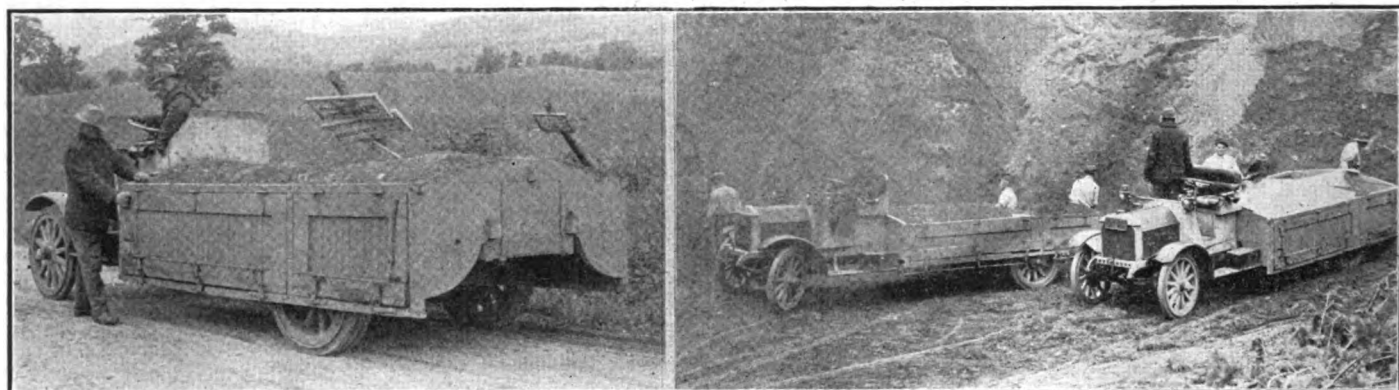
PICTORIAL NEWS OF AUTOMOTIVE INDUSTRY



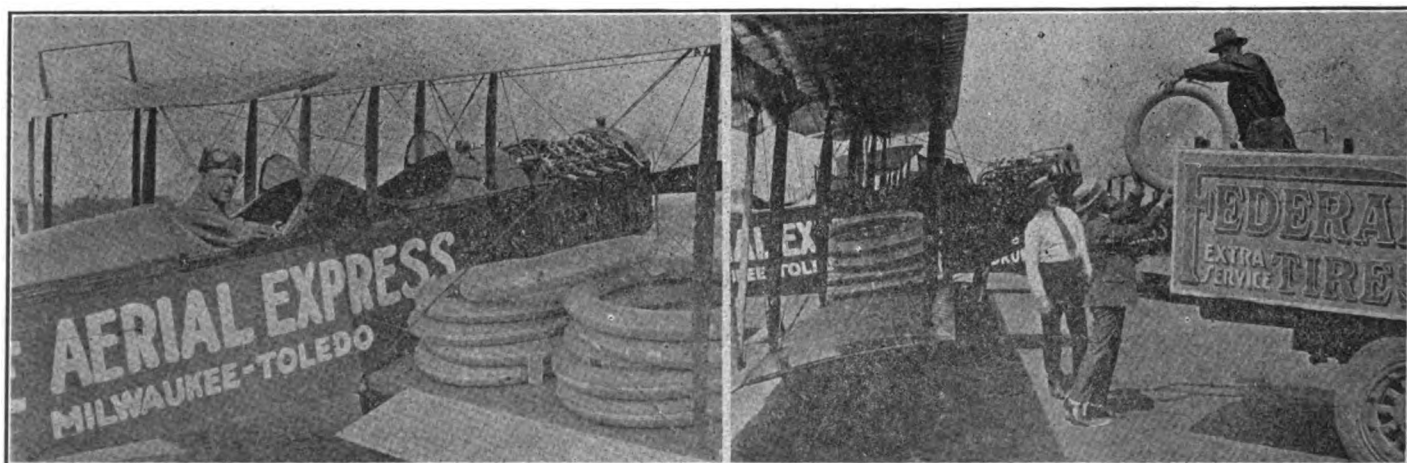
Salesmen of the Champion Spark Plug Co., Toledo, O., Who Recently Met in Convention.



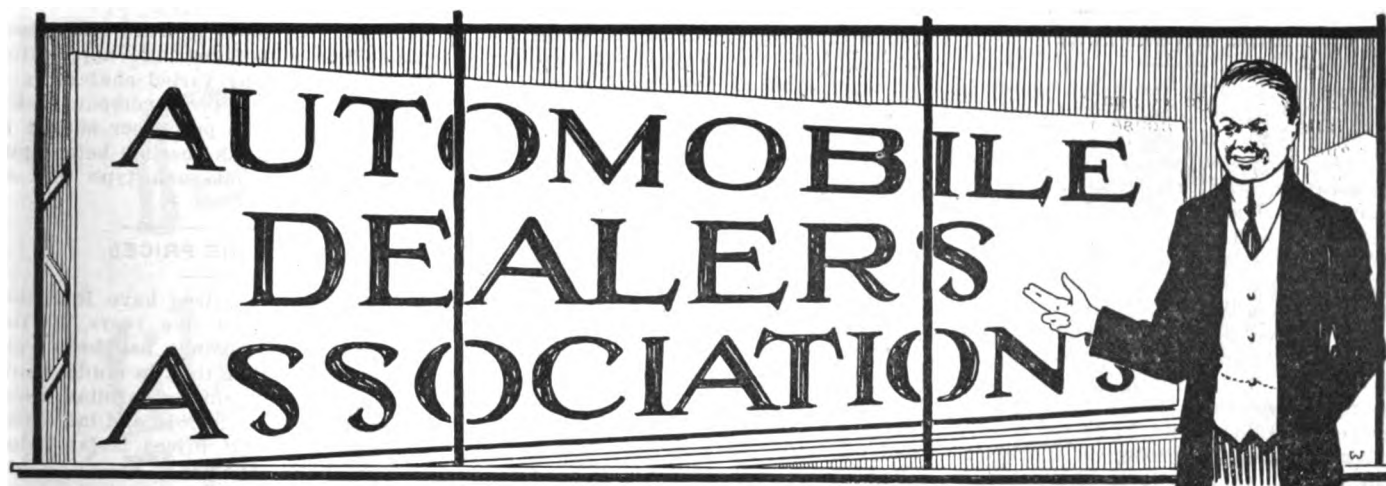
Denby Model 27 Four-Ton Truck Working with Farm Implements at Sacramento Tractor Demonstration: At Left, Weighted with Sand Bags and Hauling Four 14-Inch Bottom Plows; at Right, Harrowing with Double Disc Outfit After Plowing.



Federal Trucks with Side Discharge Bodies: At Left, an Equipment Designed to Distribute a Load from Compartments; at Right, Two Units Loading at a Sand Pit.



The First Aerial Express Plane of Commercial Record: At Left, Lieut. Milton Elliott, Ready to Start from Cudahy for Toledo, O.; at Right, Loading a Plane at the Federal Rubber Co.'s Factory.



Illinois Dealers Must Not Deface Numbers

The National Automobile Dealers' Association has warned automobile dealers of Illinois not to deface motor numbers on cars under any circumstances, even though they have bought the cars and paid for them outright. The warning is the result of a decision by the Illinois Supreme Court that the motor vehicle law of 1917, forbidding the defacing of numbers, is constitutional.

The Topeka, Kan., Automotive Dealers' Association recently held its annual picnic at Tecumseh. Practically all garages and repair shops were closed for the occasion. The members were accompanied by their families and women guests. The dinner was a barbecue. Every man had been ordered to wear overalls. There were many amusing features, including the "arrests" of various members on grotesque charges. Harry G. Moock, secretary and business manager of the National Automobile Dealers' Association, praised the spirit of cooperation between dealers, garage and accessory men as exemplified at the outing.

The Greenville, Miss., Automobile Dealers' Association was recently organized, with these officers: President, J. F. Russell; vice president, J. E. Foster; treasurer, W. L. Shelton; secretary, Herbert Stanley. Plans are being made for a banquet, at which representatives of the Memphis Automobile Dealers' Association will be present.

The Baltimore Automobile Dealers' Association plans to buy property in which to establish permanent headquarters, with club features, including a grill and billiard and lounging rooms.

The Grand Rapids, Mich., Automobile Business Association's members have agreed to close nights and Sundays, with the exception of two in different

sections, who will keep open to whom all customers will be referred for night and Sunday service. These officers have been elected: President, W. K. Philip; vice president, G. A. Belby; treasurer, E. H. Kerstetter; secretary, M. D. Elgin.

The Union County, O., Auto Trade Association is holding monthly meetings, at which instructive talks are given by automobile experts.

The Ohio Auto Trade Association has established a speakers' bureau to supply the local associations with speakers for their monthly meetings. An accounting system for garages and repair shops is being worked out by a committee. The next annual convention will be held in Cleveland, Dec. 3-5 inclusive.

The Arkansas Automobile Dealers' Association, at its annual meeting, elected these officers: President, F. L. Reed; treasurer, F. L. Oilar; secretary, A. W. Parke. Under a change in the constitution each local organization will elect a vice president, who will be a member of the board of directors.

The Montreal Automobile Association, Montreal, Can., keeps its members informed on matters of interest by a weekly bulletin sent to them by mail.

The Wilmington, Del., Automobile Dealers' Association recently held a meeting to formulate some details of the future policy of the organization. Announcement was made that a charter would soon be applied for, with the present board named as directors. The board comprises Messrs. McDonald, Bixby, Ulrich, Norman, Merrick, Johnson, Loosé, Howell and H. White.

Show Building Ready Soon at Indianapolis

The Indianapolis Automobile Trade Association announces that the new Indianapolis show building, in which will be staged the 19th automobile show of the association, will be completed late this month. The show will be held during State Fair week, Sept. 1-6. The new building covers two acres and is being built at a cost of \$12,000. At the four corners will be massive pylons, in which will be situated offices, telephones and public rooms.

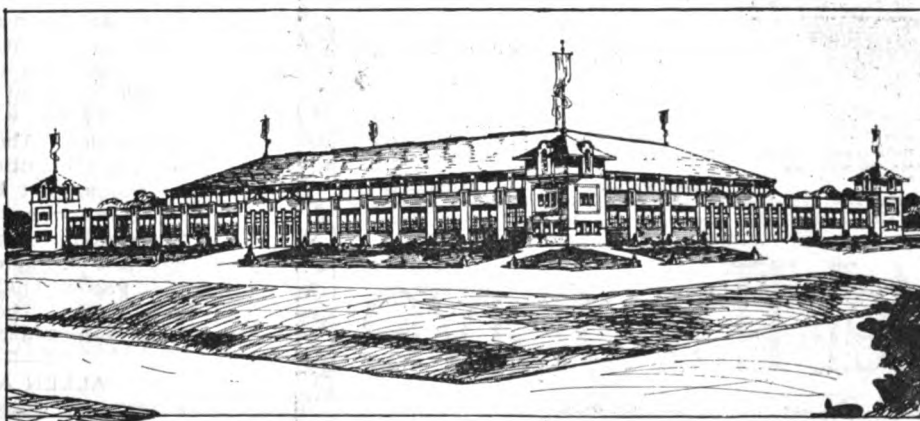
The Philadelphia Automobile Trades Association supported the Cox bill, which has become a law in Pennsylvania. The law requires the registration of the sale of used cars.

The California Automobile Trade Association, at its annual meeting, elected these officers: President, George Habelfelde; vice presidents, Chester N. Weaver, R. O. Baldwin, Ralph L. Skinner and C. R. May; secretary-treasurer, Robert W. Martland.

The Waterbury, Conn., Auto Dealers' Association has appointed a committee to bring about better facilities for unloading automobiles at the freight yards in Waterbury. A conference will be held with railroad officials.

The Boston Commercial Vehicle Dealers' Association, the Garage Association of Greater Boston and other Boston and Massachusetts automobile organizations will work in cooperation with the Motor

Truck Club of Massachusetts, which was organized recently by motor truck owners. The new club will endeavor through educational measures to reduce accidents. A frequent inspection of trucks is planned. Drivers will be given courses of instruction, and owners who wish to attend the lectures and work may do so.



New Indianapolis Auto Show Building in State Fair Grounds.

TRADE LITERATURE.

Most every large company sooner or later falls back on a house organ to keep its name before the trade. Not so with the Advance Automobile Accessories Corporation, 56 East Randolph street, Chicago—it started one. "Let's Go" is the name, and, as one big dealer remarked, "Its pages are filled with a bright, happy 'Let's Go' spirit." A big jobber said: "It is the cleverest house organ I have ever seen. The editorial contents are interesting as well as instructive." "Let's Go" is for circulation among jobbers and dealers. If you have not received your copy, or do not receive it regularly, the publisher of "Let's Go" will be glad to mail it to you. Simply drop a post card.

* * * * *

The Breeze Manufacturing Co., Newark, N. J., has just issued an unusually interesting trade 36-page book, going into detail with the subject of flexible metal hose. The company announces that there

has been no catalogue in this country on the subject, and only one issued in a foreign country. The foreign one was published some years ago, and contained only figures and prices with no descriptions whatsoever. This new book of the Breeze Manufacturing Co. has descriptive matter covering metal hose in detail for every type and method of winding. It shows how it is applied and why, and what number of trades or industries use it. Being illustrated fully, the descriptive matter is readily understood. It is dedicated to the engineers, mechanical superintendents, factory managers, purchasing agents and students of mechanics, as it presents technical information and furnishes the solution of many puzzling engineering problems. There is hardly an industry which does not use flexible metal hose in some form, either bare, covered or reinforced. Because of the expense attached to the publication, copies will be mailed only upon request on a business letterhead, or will be given through a representative. Flexible

metal hose in itself is little understood from the standpoint of application. There are so many varied characters of winding that the Breeze company takes the stand that the purchaser should be informed as fully as possible before purchasing as to what each type will accomplish.

GASOLINE PRICES.

While gasoline prices have increased steadily during last five years, in line with crude oil, advance has been relatively much smaller than in crude, showing effect of stabilizing of gasoline prices by the government in 1916 and indicating gasoline at present prices is far below what could be expected.

Figures issued by geological survey show marketed production of crude oil in United States in 1918 amounted to 355,000,000 barrels, against 341,000,000 barrels in 1917. Output of gasoline in 1918 increased in proportion, but demand for gasoline has increased in even greater proportion.

If gasoline prices had gone up to a degree proportionate with advances in crude oil, New York price would be 39 cents and the Chicago price around 33 cents a gallon. Present New York price is 24½ cents, tank wagon basis, and Chicago 21 cents.

HORSES AND AUTOMOBILES.

Since 1899 the United States has produced over 7,700,000 automobiles. Half of these were manufactured since the end of 1915. Manufacturers propose to put out over 2,000,000 cars, valued at \$1,500,000,000, in 1920. Some think the horse is doomed to the fate of the Great Auk, or at the best, a cage in the Bronx Zoo. But on the contrary horses are on the increase. There are 21,534,000 in the country now, and of their poor relations, the mules, there are 4,925,000, and the total value is \$2,800,000,000. The equine family was never more numerous, or valuable. In Europe the American horse is more popular than tourists, for they are going over by thousands, and in 11 months of the fiscal year added \$5,000,000 to our export trade. The horse holds a place in our life which no mechanical invention can supplant.

NEW PORTER CAR.

The American and British Corporation, Bridgeport, Conn., plans to begin quantity production of the Porter car next month. The car was originated by Finley R. Porter, who is a director of the corporation. About a dozen of the cars, bearing the initials of Porter, were put on the market before this country entered the war. The schedule calls for 350 cars the first season. The Porter will sell for about \$5000. It will have the Porter engine, of more than 100 horsepower. The Morton W. Smith Co., New York, will be distributor.

ALLEN ADVANCED \$100.

The new Allen 43 is advanced \$100, to \$1395 f. o. b. factory at Columbus, O.

HOTEL EMPIRE

**Broadway at 63rd Street
NEW YORK CITY**

Room, use of Bath	Room with Bath
\$1.25	\$2.00

Parlor, bedroom
and bath, **\$3.00**

Add to the above rates, 50c. for each
additional person.

All Surface Cars and Fifth Avenue Busses
pass the door.
Subway and "L" stations—
two minutes.

Beautiful Central Park—One block.
OUR RESTAURANT is noted for its
excellent food and moderate prices.
P. V. LAND, Manager.

**Centrally
Located**
Near all the Famous
Shops and Theatres





W. 72nd St. Between Broad-
way and
Columbus Ave.

Subway, Elevated, Bus Lines and
Surface Cars within a half block.

300 Rooms 200 Bathrooms
ABSOLUTELY FIREPROOF

Room with private bath.....	\$2.50 and up
Parlor, bedroom with private bath....	\$4.00 and up
Parlor two bedrooms with private bath..	\$6.00 and up

Restaurant and Service is the best, at reasonable prices;
72nd Street entrance to Central Park, one block, all shopping and amusements within five to
ten minutes. Riverside Drive and Hudson River two blocks. Send for illustrated booklet.
EUGENE CABLE, Manager

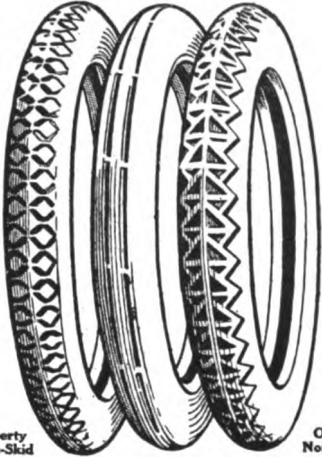
Hotel Hargrave

NEW YORK

Comfort, Refinement and Lux-
ury combined with very
moderate rates.

PRESSMAN

Liberty
Tires



Omar
Tires

EVERYWHERE

Longest Service When Measured
by the Price You Pay

OMAR and LIBERTY tires are made and sold to a definite policy—highest quality obtainable and a guarantee of service.

It means absolute satisfaction to users. OMAR and LIBERTY tire dealers will advise you that these tires will deliver full service mileage and the purchaser will receive full value.

There is no condition, no uncertainty. The tires must afford 100 per cent. service.

Measured by first cost and by mileage guarantee OMAR and LIBERTY tires are unequalled; the saving in any event is such they are the most economical tires to use.

Back of this guarantee is the manufacturer. Unless the tires satisfy he is the loser. Only by maintenance of the highest quality can his prestige and the business of his distributor endure.

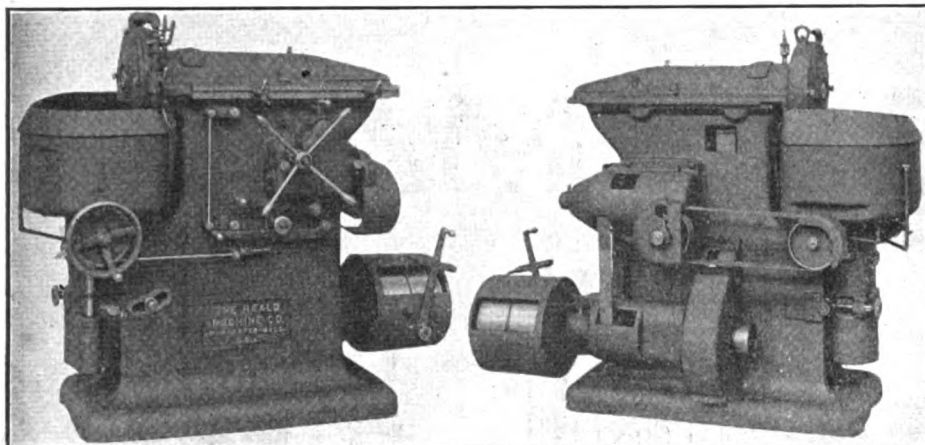
Compare these tires and the prices with all others. Contrast the guarantees. Consider the service of each. Then you will equip with either OMAR or LIBERTY tires.

Then you'll understand fully what you get for what you pay and what a positive guarantee means to you.

DEALERS: OMAR and Liberty production is rapidly increasing. We can offer a limited number of splendid dealer contracts. The trade discounts are liberal. You can meet any competition and make more than good profits.

Correspondence invited. Full information at request.

PRESSMAN TIRE COMPANY
PHILADELPHIA PENNSYLVANIA



Front and Rear Views of Heald Rotary Surface Grinding Machine.

Heald Rotary Surface Grinding Machines. The Heald Machine Co., Worcester, Mass., has just brought out two new rotary surface grinding machines. They have been designed for some time and have passed through the company's experimental and service departments ready to be made up in lots for the trade. So far only two machines of each have been built up, but by the first of August the company will be able to supply any orders that may come in.

One is equipped with an eight-inch chuck and is known as No. 20 Rotary Surface Grinding Machine. The other, with a 12-inch chuck, is known as the Heald No. 22 Rotary Surface Grinder. These machines have been built up very similar to each other; in fact parts of one have been used in a good many cases on the other. They have been built with the idea of getting a more economical machine in price than the company's large size grinders, but with the same production and finish.

The eight-inch machine which the company previously built was of like construction, but while it did excellent work, is not rigid enough for a great many customers. On the other hand, the No. 225 12-inch and the No. 260 16-inch machines in many cases are too expensive and equipped with too many refinements for the commercial trade.

In the new machines the company has taken the features of both of its small and large machines, simplified them and has now two very fine rotary surface grinders to offer the trade.

The eight-inch or No. 20 and 12-inch or No. 22 rotary surface grinding machines have been designed for manufacturing purposes and at the same time will give an extremely fine finish. They have been built massive, yet simple, having all the necessary mechanical refinements required to readily get various speeds and adjustments.

The wheel slide is a massive casting, having a flat and "V" way, which assures alignment at all times. The bearing surfaces are large and carefully protected from grit and dirt. Experience has proven that a downward pull of the spindle belt adds greatly to the rigidity and has been incorporated into the design of these machines.

The wheel guard is made separate from the wheel slide. It is not put on, however, in the usual manner, as it has the back face finished off to fit a finished surface on the wheel slide, making the two parts practically one. The advantage of this design is that if a customer should for any reason desire to use a larger wheel he will be able to do so.

The wheel spindle is large in diameter and made of chrome nickel steel. It is mounted in a straight, plain, adjustable bearing at the grinding wheel end. Adjustments for this bearing can be readily made through a hole in the top of the wheel slide provided for that purpose.

This is the only adjustment required, as the rear end of the spindle is mounted on ball bearings. A large sight feed roller for the front bearing insures an ample supply of oil at all times.

The main drive bracket receives the power from the main line by tight and loose pulleys and transmits it directly by belt to the main speed box, wheel spindle and pump. The guard for the tight and loose pulleys is adjustable so that the openings can be lined up for the belt. The shifter lever is arranged with a spring plunger which locks it in place in the off or on position.

The main speed box, which is situated on the rear of the machines, furnishes power to the wheel slide by a three-step cone and three speeds to the chuck through a bank of gears. The speeds of wheel slide and chuck are independent of each other, allowing for a large latitude in regard to speeds and feeds. The speeds to the chuck are controlled by a pull rod on the front of the machine.

All control levers and adjustments are within easy reach of the operator.

The chuck spindle is driven by spiral gears, one of which is mounted directly on the spindle. This spindle is mounted in a sleeve which has vertical adjustments. The upper portion of the spindle rests in a taper bearing, while the lower end is equipped with ball bearing. With this design adjustment is never necessary, as the wear is automatically taken up. The chuck bracket is adjustable to allow for grinding of concave and convex surfaces to angles up to 10 degrees.

The feed to chuck is made by a hand wheel and vertical screw through a nut on the spindle sleeve. The machines are also equipped with automatic vertical adjustment to the chuck which will feed from .0005 to .003 at each end of the wheel traverse.

The water equipment including pump, tank, water guard and connections are regularly furnished with every machine. The tank is of unusual capacity, giving a most liberal volume of water, while a swivel joint in the distributing nozzle enables the operator to direct the flow at any desired point.

A Heald magnetic chuck, style eight-inch for No. 20 and style 12-inch for No. 22 are regular equipment. Three-jaw chucks or face plates with special fixtures may be substituted if desired or the work requires it.

Motor drive machines can be furnished if necessary, the motor being placed where it is most convenient, on the floor, wall or ceiling and belting directly to the main drive pulley. A few minor changes to the main speed bracket is all that is required when a machine is to be motor driven.

The specifications follow: No. 22, 12-inch: Face diameter, 13 3/4 inches; size of grinding wheel, 12 inches diameter, 1 1/4 inch face, five-inch hole; greatest dis-

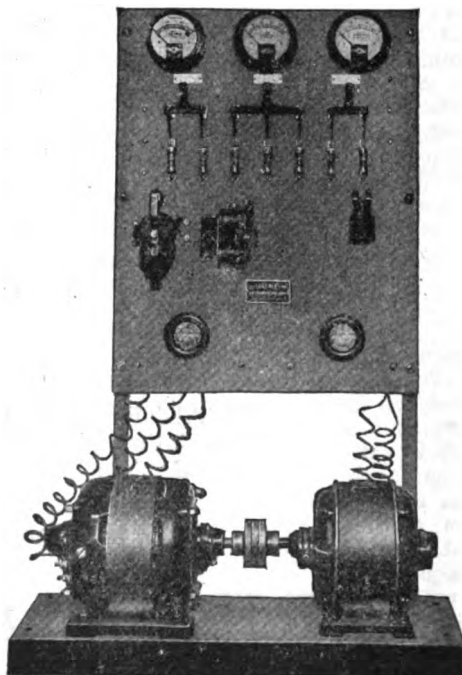
tance, top of chuck to center of wheel, 10 inches; greatest distance between face of 12-inch diameter wheel and top of magnetic chuck, four inches; smallest diameter grinding wheel which may be used, 7 1/2 inches; vertical adjustment of chuck, five inches; largest swing inside of water pan, 16 inches; floor space required, belt drive, 48 by 70 inches.

On the No. 20 the specifications are: Diameter magnetic holding surface, standard chuck, eight inches; face diameter, 9 1/4 inches; size of grinding wheel, 10 inches diameter, one-inch face, 3 1/2-inch hole; greatest distance, top of chuck to center of wheel, 8 1/4 inches; greatest distance between face of 10-inch diameter wheel and top of magnetic chuck, 3 1/2 inches; smallest diameter grinding wheel which may be used, 6 1/2 inches; vertical adjustment of chuck, five inches; largest swing inside of water pan, 13 inches; floor space required, belt drive, 48x60 inches.

Manufactured by the Heald Machine Co., Worcester, Mass. Prices quoted on request.

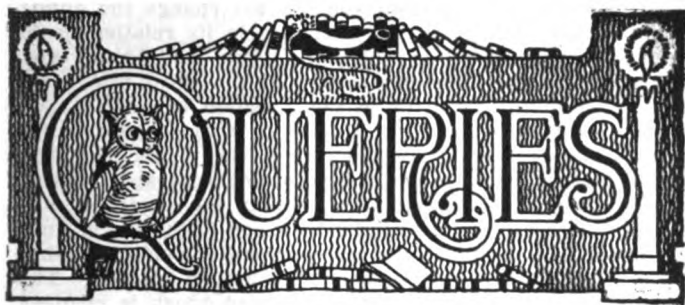
Andre Motor Generator Set. The Andre Motor Generator outfits are manufactured in three sizes—for the private owner charging one battery, the garage repairer who charges one or more batteries a day, and the No. 32, shown in the cut for charging batteries on a larger scale.

In charging batteries not all can be charged at the same rate. For instance, one battery may be in good condition and can be charged at a higher rate than another. By having more than one circuit the batteries may be put on charge according to their condition. That is, the charging may be at any voltage or amperage within the capacity of the set. In the case of the No. 32 set a low charging rate of three amperes can be reached on one circuit, while a high rate of 12 amperes can be obtained from the second circuit. When there are only two or three batteries to charge at one time they can be placed on one circuit. This means a saving of current, for, while the motor still runs at the same number of revolutions a minute, consumption of current is reduced through the reduction of the motor load. Short circuiting of the batteries when the current falls is protected in the Andre motor generator sets by means of an automatic cutout.



Manufactured by Julius Andre & Sons Co., Milwaukee, Wis. Prices on application.

(When Writing to Advertisers, Please Mention the Automobile Journal.)

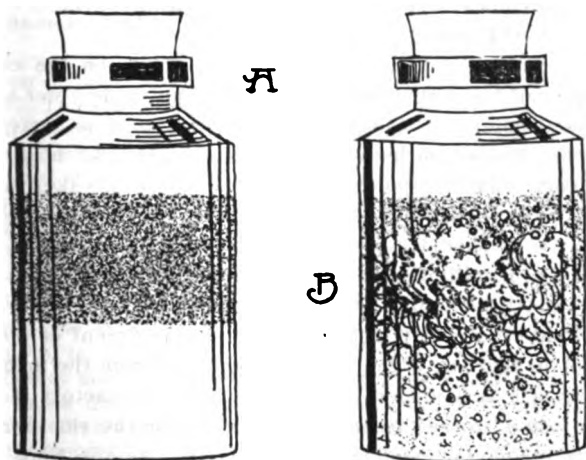


OIL TEST.

(C. A. R., Hartford, Conn.)

I am told that the quality of an oil can be determined by mixing it with water. Is this correct, and if so what does it indicate?

Select a bottle which is absolutely clean and into it pour one-third water and a like quantity of oil. Cork the bottle and then shake vigorously for about a half hour. The solution should then be allowed to stand for 24 hours. If the oil is of good quality and free from acids, the lubricant should appear clear at the top and the water clear at the bottom, as shown in the accompanying illustration A. Should sulphuric



A Simple Test to Determine Quality of Oil.

acid compounds be present in the oil it will be indicated by a curdled mass floating upon milky water. The curdled matter is a form of sulphuric acid soap and the amount present denotes the quantity of impurities. This condition is shown at B.

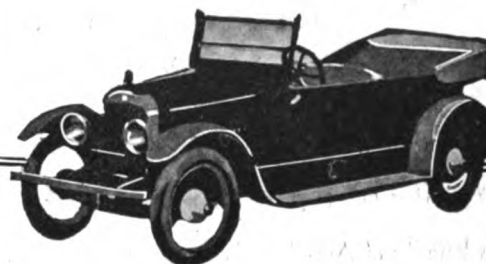
DELCO GENERATOR TROUBLE.

(L. B., West Warren, Mass.)

Kindly answer the following questions through the Automobile Journal. I have a 1917 model H Hudson Super-Six from which I have removed the Delco generator and replaced a broken ball in the armature bearing, turned down the commutator and fitted new brushes. The ammeter shows a charge from five to 20 miles an hour, but above 20 miles the indicator will drop back to zero. I am also having trouble with the carbon brushes wearing out in two weeks time in an Auto-Lite generator used in an Overland model 85, four-cylinder car. What is the proper setting of the points on the circuit breaker of the Auto-Lite generator? What is the proper way to wire the tail lamp on a Ford car with the two head lights?

1. The model H Hudson car has a Delco generator using a third brush on the commutator which regulates the current generated. The purpose of this third brush is to govern the charging current through the field windings of the generator by a shunt winding, and is connected direct through the ammeter. In turning down the commutator and later fit-

(When Writing to Advertisers, Please Mention the Automobile Journal.)

COSTLY
PAINTING
PREVENTEDREFINISH
YOUR CAR

Preserve the finish on your car, the Original Varnish on your car won't last forever—use Panvar and keep your car in respectable condition—to ride in a shoddy, dull, worn, second-hand looking car is downright foolishness, when you can give your car that shipping date appearance in a couple hours time, for about \$3.00 and add \$800 to the looks of your car and not lay up the car a single day.

Panvar
TRADE MARK

Self-Leveling Laque

WHAT PANVAR IS

A lustrous, lasting, transparent liquid to take the place of varnish, beats varnish in lustre, lasts quite as long, is self-levelling, not said to be, but *actually is*, for Panvar is as thin as water, so it can level itself and not show brush streaks, but when it dries it dries harder than varnish—free from stickiness, can be used on the metal, wood, seats, tops and plated parts—of itself Panvar cannot turn white, creamy or crase—it's a lasting, living up preparation that has varnish beaten in a hundred ways—ANY NOVICE FOLLOWING SIMPLE INSTRUCTIONS CAN APPLY WITH ASSURANCE OF SUCCESS. PANVAR is prepared for cars where ground paint is in good condition, but varnish has become dull, worn, or needs livening up. Such cars can be made to look like new in an hour's time.

FIX-A-MAR COLORS IN TUBES

If there are bruised places in the ground coat of paint, buy a tube of our FIX-A-MAR color to touch up the marred parts, at \$1.00 per tube delivered. SEND STAMPS FOR COLOR CARD.

TWO QUARTS ENOUGH FOR LARGE CAR

If finish is much worn, two coats may be necessary. Easy proposition for anyone, so why neglect your car, or pay a big price for an expensive repainting job.

SEND \$1.50 for ONE QUART
3.00 " TWO
5.50 " FOUR

WE PAY PARCEL POST CHARGES

Add 25c. per quart to points west of Rockies

SMALL TEST SAMPLE 25 CENTS

EXCLUSIVE HOUSE TO HOUSE DISTRIBUTING AGENTS
WANTED, PROFITABLE WORK AND TERRITORY

MOTORISTS' DIRECT ORDER COUPON

7-19


THE PANVAR CO. 618 Bulletin Bldg. Philadelphia, Pa.

Send by express or parcel post paid.....quarts

Name.....

Address.....

Garage Owners and Dealers, write for discounts and sales help.



ZENITH CARBURETOR

*All That Its
Name Implies—*

THE HEIGHT OF PERFECTION

You cannot secure more efficient and economical carburetion than by the Zenith. Simplest to adjust, and once adjusted stays adjusted.

Known the world over as the

ZENITH OF CARBURETOR EFFICIENCY

A long list of American builders of cars, trucks and aeroplanes believe this simple, plain tube device to be the best insurance for permanent carburetor satisfaction.

Zenith Carburetor Co.

New York Detroit, U. S. A. Chicago

METZ Master Six

The car of the Year A New England Product

Honest through and through

\$1695 F. O. B. factory **FULLY EQUIPPED**

We are now extending our agency list
Information at request

METZ SALES CORPORATION

BOSTON, MASS.

For all Ford's \$25.

BARRETT

SELF STARTER PRIMER
5 YEARS GUARANTEE

IF YOUR DEALER DOES NOT HANDLE THEM
WRITE US - 1777 BROADWAY NEW YORK

ting new brushes, although you did not change the adjustment of the third brush, yet a change in its relation to the commutator nevertheless took place. This may be corrected by loosening the adjusting screws of the third brush, and moving it to the right, or in the direction of rotation, will increase the charging rate. Moving it in the opposite direction will decrease the charging rate. In fitting the third brush it is necessary to use a piece of fine sandpaper between the brush and the commutator, keeping the sandpaper side next to the brush and drawing it back and forth several times to insure that the brush fits the commutator perfectly, otherwise the ammeter will not show the proper reading. This should be done each time that the third brush is changed. This brush is set at the proper position at the factory and ordinarily is correct for the average driver. With the Hudson car the generator should begin to charge at eight miles per hour, reaching its maximum at 25 miles and gradually cut down beyond that speed so that the battery will receive a smaller charge, but not enough to damage the storage battery above that speed.

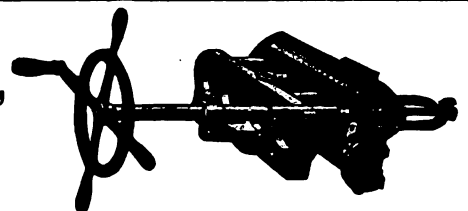
If you change the setting of the brush your trouble will no doubt be eliminated.

2. As to the carbon brushes wearing out in two weeks time on an Auto-Lite generator leads to the belief that there is too great a tension on the brushes from the springs that hold them. Occasionally one may use brushes that are too soft, which will wear quickly. Using a brush of harder composition will probably afford normal service.

3. As to the proper setting of the points on the circuit breaker of the Auto-Lite generator, you no doubt refer to the contact points in the timer, or igniter as it is sometimes called. The space between them should be 1/32 inch when the cam holds the points apart. The circuit breaker on the dash never needs adjustment, but if it ever should become defective it should be removed and sent to the factory.

4. In installing a rear light for use with the Ford magneto and head lamps several devices for this purpose have been shown recently in the Accessory Department of the Automobile Journal, which may be purchased from the manufacturers at a very moderate cost. The most satisfactory method is to use a storage battery or dry cells for the side and tail lights, using the headlights for driving. As the Ford magneto develops a current in the later models of 18 volts and as this current is alternating and varies with the speed of the engine, it is necessary to use nine volt lamps in the headlights and to still further use a light in this series circuit in a rear light would necessitate the use of three six-volt lamps of whatever candle power is required, and would have the disadvantage of the rear light going out when the engine is stopped. A battery of either type meets this condition nicely and is the more practical.

**Repairmen,
Listen!**



Patented May 19, 1914; Dec. 15, 1914; June 20, 1916; June 26, 1917.

The Heiser Improved Cylinder Reboring Tool for FORD MOTORS is the only reboring Tool in the world that is self-sharpening. It is the only tool that rebores between centers—this insures a finished cylinder, square with the crankshaft, round, straight, true and free from taper. It is adjustable and the only tool that will rebore different sizes without losing the adjustment. The best mechanic in the world can't build reputation without proper TOOLS and EQUIPMENT. THE HEISER IMPROVED CYLINDER REBORING TOOL makes good shops out of poor ones and better shops out of good ones. Write today for full particulars.

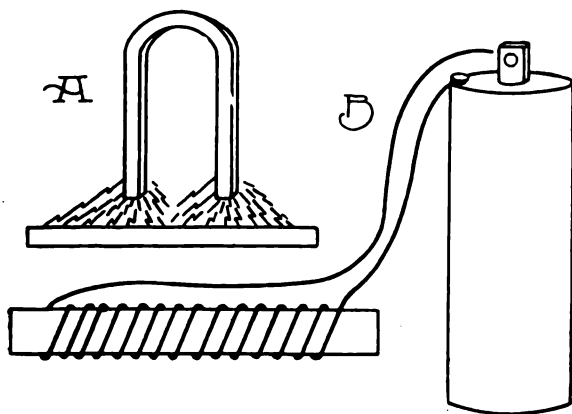
HEISER SPECIAL TOOL CO., 216 Rogers Bldg., Kingston, Mo.

MAGNETS.

(H. M. P., Worcester, Mass.)

Will you explain through your readers' column the difference between a permanent and electro magnet? What is meant by a compound magnet?

The permanent magnet is a piece of steel which has been magnetized and will generally retain its strength for a long period. Because of its ability to retain the magnetism it is termed a permanent magnet. This type is possessed of permanent attractive qualities, because once it has drawn a piece



Sketch illustrating the Difference of Principle in Permanent and Electro Magnets.

of iron or steel to it, the piece cannot be released except by force. The electro magnet, also termed the solenoid, utilizes electric current each time magnetism is produced. The apparatus usually consists of a coil of soft wire wound round a soft iron core. When the current is switched on the field induces a much greater flux in the core than it would induce in the air. When the current is switched off the most of the magnetism in the core vanishes and the object is instantly released. The two types of magnets are shown in the accompanying illustration.

A horse shoe magnet, such as is commonly used in the magneto, is often referred to as a simple magnet. By placing two or more of these simple magnets on top of each other, it is found that the magnetism is much stronger. When two or more simple magnets are built on each other in this manner they constitute what is known as a compound magnet.

TO DETERMINE HORSEPOWER OF ENGINE.

(A. E., New York City.)

Kindly tell me how I may determine the horsepower of my engine and how to find the horsepower when the bore, stroke and number of revolutions are given? The bore and stroke and the number of revolutions of my engine are four by four inches and 1200 revolutions a minute. What is the horsepower? What is the meaning of piston displacement and why is it preferred to horsepower when figuring the power of racing cars?

The best formula for figuring the horsepower of your engine, using the figures given, is not the S. A. E. method. It includes the stroke and revolutions as well as the bore. It is:

$$D^2 \times N \times L \times R$$

$$\text{Horsepower formula} \frac{\quad}{C} = \text{H. P.}$$

This means, square the diameter of the bore and multiply the result by the number of cylinders (N); multiply this result by the length of the stroke (L); multiply this result by the given number of revolutions (R) per minute of the crankshaft; then divide this total result by the constant (C). The constant for a four-cylinder engine is 13,000.

In the case of your engine the horsepower would figure as follows: Four times four equals 16, times four equals 64, times four equals 256, times 1200, equals 307,600, to be divided by the constant 13,000, which gives the result as 23.6 horsepower.

(When Writing to Advertisers, Please Mention the Automobile Journal.)

THE MOTALARM**The Watch Dog of Your Motor****"YOU DON'T HAVE TO WATCH IT"**

This new appliance is unlike any radiator device ever put on the market. It does not merely show you when you are in danger from an overheated engine—it tells you. And it tells you in unmistakable terms by an insistent siren which can be heard in the noise of traffic or a heavy storm. Just as soon as the water runs low and the cooling system fails to function efficiently, the reliable MOTALARM gives you warning and keeps it up until the condition is remedied. But the warning is given before the danger point is reached—after the signal sound you can still travel without danger for thirty miles to a place where water may be obtained. This is the distinctive feature of the MOTALARM.

**Safeguards the Motor**

Every minute you drive your car with motor overheated brings you closer to the repair man and a big repair bill. When the supply of water in your radiator runs low, overheating is the inevitable result. With this condition comes the burning of bearings, cracking of cylinders, loss of power, backfiring and all the other costly and troublesome consequences. The way to avoid this—the way to prevent the water in the radiator from ever running too low—is to equip your car with THE MOTALARM.

Requires No Attention

The beauty of the MOTALARM is the fact that you do not have to depend on your remembering to glance at it from time to time—you can forget it's there. The MOTALARM is your watch dog. It is on guard every minute of the day; it pays for itself from the moment you first install it. It serves also as a convenient water gauge at all times. The MOTALARM is an attractive, dignified radiator ornament, which enhances the appearance of even the finest of cars. It is an absolute necessity. It is made to fit the radiator cap of all cars—your car should be installed with it without any delay.

PRICE \$3.00 From most reliable dealers or direct from us.

DEALERS: The MOTALARM is sure to be one of the best sellers ever placed on the motor car accessory market. There is virgin territory ready for live dealers which will be allotted as fast as applications are received and approved.

THE MOTALARM CORPORATION

1777 Broadway,

New York

SPECIAL SALE—AUTO TIRES

GUARANTEED 4000 MILES

If a tire fails to give service of 4000 miles we will replace it with another tire for $\frac{1}{2}$ price marked below:

Size	Plain	Non-Skid	Tube
28x3	\$6.45	\$7.45	\$2.30
30x3	7.45	8.35	2.15
30x3 $\frac{1}{2}$	8.95	9.95	2.40
31x3 $\frac{1}{2}$	9.45	10.45	2.45
32x3 $\frac{1}{2}$	9.95	10.90	2.50
34x3 $\frac{1}{2}$	10.45	11.30	2.80
31x4	13.45	14.60	3.20
32x4	13.95	14.95	3.30
33x4	14.45	15.45	3.35



Size	Plain	Non-Skid	Tube
34x4	\$14.95	\$15.95	\$3.45
35x4	15.45	16.95	3.55
36x4	15.95	17.50	3.60
34x4 $\frac{1}{2}$	18.45	20.45	4.30
35x4 $\frac{1}{2}$	18.95	20.95	4.40
36x4 $\frac{1}{2}$	19.45	21.45	4.45
37x4 $\frac{1}{2}$	19.95	21.95	4.50
35x5	20.95	23.45	5.15
37x5	21.95	24.75	5.30

Deduct 2 Per Cent. When Check or Cash Accompanies Order.

10% Deposit Required on All C. O. D. Orders.

We Carry a Full Line of New and Reconstructed Tires.

ATLAS TIRE COMPANY, Tires and Tubes Shipped Express Prepaid

Telephone Poplar 2970

822 BROAD STREET, PHILADELPHIA, PA.

The S. A. E. formula figures horsepower in a different manner, the horsepower being —
D2N
2.5

Squaring the bore of the engine in your case would give a result of 16 and multiplied by the number of cylinders (N) would give 64. Dividing this by the constant 2.5 would give 25.6 horsepower.

This formula is used by manufacturers and the license officials of the different cities. As you will notice the horsepower as determined by the first formula is less than by the S. A. E. formula, the former being considered the more accurate.

Piston displacement means the actual number of cubic inches displaced by the movement of all the pistons from one end of the stroke to the other. Considering just one piston, it equals the area of the piston head in square inches multiplied by the length of the stroke in inches, and in a four-cylinder engine for instance, the total displacement would be four times this result. The formula would be as follows: D2x.7854xSxN equals piston displacement. The constant is .7854.

With your engine the displacement would be 201.06 cubic inches.

The reason for using this formula for rating racing cars is that the A. A. A. allow no cars to compete in races sanctioned by it having more than 300 cubic inches piston displacement. The ratings are checked very carefully and results are accurate.

WELDING CRACKED CYLINDERS.

(O. C., Milford, Mass.)

Could a leaky cylinder of an engine be welded as strong as it was before it was cracked, and will it hold compression? Will I be able to get as much speed and power as before without any change?

If a cylinder has only a small crack and water comes through slowly, it may be repaired by drawing down the wa-

ter in the radiator about half way. Put into the water about a half can of Se-ment-ol or radiator compound. Then fill your radiator with water and drive the car. After a day or two you will find that this compound has found its way through the crack in the cylinder, forming a clot on the outside, where it has come in contact with the air. After the cement has set in this manner draw the water out of the radiator and refill it with fresh water. This will leave your circulating system free of foreign substances that might injure the brass of your radiator or hose couplings. The amount of the compound to be used depends on the size of radiator and engine. For a small car use a smaller quantity. In case of a crack in the cylinder too large for this method of repair, you will have to resort to welding. Sometimes the person doing the welding uses too much heat, which may warp the cylinder so its bore is not true, or it may be hardened so that a machine tool will not cut it. If the leak is inside of the cylinder it is better in the long run and more satisfactory to put in a new cylinder.

As to your getting as much power and speed as before, there should be no difference in this respect as long as nothing else is changed about the engine. If the carburetor or timing are not disturbed the speed and power should remain the same.

GENERATION OF ELECTRIC CURRENT.

(F. E. B., Charlottesville, Va.)

I have a Saxon Four with a Ward-Leonard generator and starter. When I drive 15 miles an hour it gives as high as 10 amperes, but when going 25 miles it only gives around seven or eight. Is this normal? If not, please tell me what change to make.

Your system is operating normally. If the amperage increased in proportion to the speed of the engine it would damage the battery. All systems are provided with some means of regulating the current generated so as not to charge the battery above a certain rate.

(When Writing to Advertisers, Please Mention the Automobile Journal.)

TIMING VALVES ON FOUR-CYLINDER MOTOR.

(H. R., New York City.)

How can the valves be turned on a four-cylinder car? Have had my engine overhauled recently and since I have begun to use it again it does not seem to have as much power as formerly. Have reason to believe that the timing was changed. How can I find out?

In timing the ignition of a motor one should base his operations on one particular cylinder, and this should be the most accessible one. Let it be assumed that a mechanic is required to test or correct the timing of a four-cylinder, four-cycle, vertical engine. He would have to know the order in which the cylinders fired and how to find the firing center of number one cylinder. As the operation of valves on most motors may be readily seen, the firing center and the order in which the cylinders fire can be easily learned from the action of either set. For instance, if on turning the motor over slowly the intake valve of number one cylinder opens and closes, then that of number three cylinder and following number three that of number four operates, the mechanic need go no further, for he knows that the engine fires 1-3-4-2. The exhaust valves of course may be used for the same determination.

One very simple method of finding the firing center of a cylinder is to open priming cocks of all cylinders but one. Turn the motor over slowly till compression is found. Then open the closed cock and insert a stiff wire till it rests on the piston head. Then carefully bring the piston to the top of its stroke. The cylinder will then be on its firing center. When the firing center and the order in which the cylinders fire are known, all that remains to be done in timing an engine is to set the revolving segment of the commutator or distributor so that a spark will occur in the proper cylinder when the spark control lever is advanced about one-third or with the spark control lever fully retarded and the piston about one-half inch to one inch down on the explosion stroke, set the segment so that it just begins to make contact. By following this plan the ordinary mechanic can time to a fairly accurate degree the valves of a four-cylinder engine without knowing much about the theory of the design. This is the rule followed by most garage repair men and can easily be used by the owner who wishes to be sure that the timing of his own car is correct. We feel sure that this will solve your trouble.

NOISY PUSH RODS ON BUICK ENGINE.

(J. M., Fayetteville, Ia.)

I have a Buick Little Six, 1918 model. There is a click about the engine that I have never been able to locate. Some say that it is the push rods and others that it is the muffler. It is not a continuous noise and the running of the engine is not impaired. The noise sounds as if a blow were struck with a wooden mallet on the cylinder. If I grease the valve stems the noise will stop, but after running about 50 miles will start again. I have ground the valves and cleaned the spark plugs, but without relief. The car has been run about 4800 miles.

The cause is evidently noisy push rods. This is evident when you grease or oil the rods and the noise ceases. To adjust these rods for wear warm the engine and while it is heated adjust the valves one at a time to have a small clearance between the end of the rocker arm and the valve stem. The clearance should be such that an ordinary business card may be inserted between them. Tighten the adjusting nuts easily so as not to strip them. Be careful not to get the adjustment so close that the rocker arm will hold the valve open, for if you should the engine would not develop its power and may misfire. The adjustment for the rods on your model is at the tops and is very easily made. If you have any doubts as to your own work have a Buick mechanic make this adjustment for you.

(When Writing to Advertisers, Please Mention the Automobile Journal.)



The Hotel Wellington

7th Avenue at 55th Street
NEW YORK

Located in the center of the Automobile industry, theaters and shopping districts, conveniently reached from all steamships and railroad terminals. The beautiful Central Park is within three short blocks of the hotel.

RATES

Room with use of bath, one person.....	\$1.50 & \$2
Room with use of bath, two persons.....	2.50 & 3
Room with bath, one person.....	2.50 & 3
Room with bath, two persons.....	3.50 & 4
Parlor, bedroom and bath, 1 or 2 persons..	5.00 & 6
Parlor, bedroom and bath, three persons..	6.00 & 7
Parlor, 2 bedrooms and bath, 3 or 4 persons	7.00 & 8

Special rates can always be arranged for extended periods on contract, and rates vary with the desirability of the quarters selected, the number of people in the party and the length of stay.

Operated under the Knott Management.

S. M. EATON, Manager.

PAIGE

The Most Beautiful Car in America

A complete line
of touring and
enclosed models.

Write for Literature.

Paige-Detroit Motor Car Co.

DETROIT, MICH.



Giant Searchlight

The highest quality lowest priced
lamp produced.

LIST PRICE With Mirror.....\$6.00
Without Mirror.....\$5.00

CULVER-STEARN'S MFG. CO.

Worcester, Mass.
Detroit, Mich.

Agents:—To sell Factory Reconstructed Mileage
•Guaranteed Tires. Exclusive territory to good live
wires. Excellent money making proposition to
agents. Write at once.

ATLAS TIRE CO., 1777 Broadway, N. Y. City



Improve Your Ford

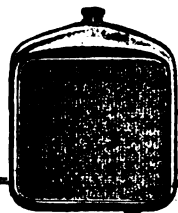
with a
NATIONAL ZIG ZAG RADIATOR

Equipped with a National ZIG ZAG Radiator your sturdy FORD will be decidedly better mechanically and wonderfully improved in appearance.

Then increased circulating cooling capacity, unusual expansion and contraction flexibility are features of National ZIG ZAG Radiators, ensuring Greater Supply of Power—A real saving in gasoline and oil.

\$28.00

F. O. B. Detroit.
Finished in either
nickel or black
enamel. Shipping
weight complete,
35 pounds.



Dealers

We are now in
agency proposi-
tion to offer
you an attractive
tion. Full infor-
mation upon re-
quest.

Ask Your Dealer or Write Us Direct.

NATIONAL CAN COMPANY

DETROIT

(Radiator Division)

MICHIGAN

**DETROIT HAYES
STORAGE WIRE
BATTERIES WHEELS**

**NEW ENGLAND
SALES & SERVICE**

MITCHELL & SMITH INC.

1090-1092 COMMONWEALTH AVE. BOSTON, MASS

WE REPAIR ANY MAKE OF BATTERY OR WIRE WHEEL

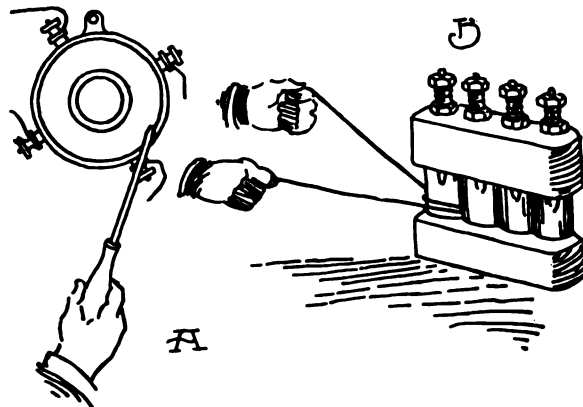
**GRANT
SIX**

Owners praise its operating economy in unstinted terms.
20 miles to the gallon of gasoline 900 miles to the gallon
of oil and 7000 miles to the standard set of tires is the
average experience.

GRANT MOTOR CAR CORPORATION, CLEVELAND

TESTING FORD COIL.

When a Ford car is equipped with a set of dry cells, or storage battery, for easy starting, the setting of the coil and the locating of ignition troubles is not a difficult matter. While the plugs can be removed from the cylinder and tested by turning the motor over by hand until the contacts are made at the timer, a much easier method is shown in Fig. A.



A, Testing a Ford Coil; B, Cleaning Oil Slight Gauges.

Place the coil switch on the battery side and then make a contact at the timer with a screw driver, as illustrated. This serves to complete the circuit in the same manner as does the roller. A buzzing sound is produced at the coil and each unit should be tested by connecting a wire to any metal part of the car and placing the other end of it on the primary connection of the coil.

ADJUSTING A SLIPPING CLUTCH.

(D. W. R., Louisville, Ky.)

I have a Chalmers model M car. The clutch slips whenever there is hard work. Have put in as much as a pint of kerosene into the oil in the clutch. Is that enough? What should I do to tighten the clutch to prevent it slipping? The car has been run about 50,000 miles and the clutch is probably worn.

Mix the oil for your clutch half and half, that is, half light oil and half kerosene. A clutch of the construction you state requires a very thin oil, as the plates must separate. Kerosene and oil in equal parts seems to serve better than any other combination. Oil with too heavy a body will cause the plates to stick together, especially in cold weather, and makes the shifting of gears difficult. Probably by tightening the plates by means of the adjustment screws the clutch will hold better on grades, but would advise you to install a new clutch unit as yours is probably worn so much that adjustment will not restore it. After a car has been driven 50,000 miles or more it is time that the clutch unit was replaced.

OIL LIGHT WILL NOT BURN.

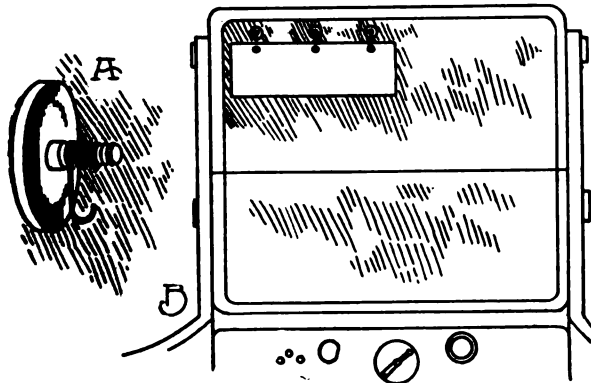
(S. D. J., Provincetown, Mass.)

Will you tell me why an automobile oil lamp should suddenly become unserviceable? I have changed the wick and supplied the fount with clean oil, but it still goes out after running the car a short distance.

The burner is apparently at fault. The simplest way to insure against this condition is purchasing a new burner. Apparently the air vent running down beside the burner is clogged, or the screen around the burner is filled with small particles of charred wick, so air cannot pass through. An oil burning lamp must have a certain proportion of air or oxygen around the flame for good combustion, and if the oil holes are filled with charred wicking air cannot pass through and the flame will burn low and eventually go out. Or the top of the lamp may be filled with soot, clogging the draft holes so that the lamp will not burn. If the lamp is used in the rear sometimes the draft beneath the car is too strong and the light will be blown out. Placing the lamp in a more protected position will perhaps prevent the condition stated.

FASTENING SIGNS TO WINDSHIELD.

There are sundry ways by which to secure a sign, such as jitney drivers use, to a windshield, but not all of them make for neatness. Fig. A illustrates a simple method which has no objectionable features. It is based upon the same principle adapted to holding shaving mirrors on window panes. Place short screws in the holes in three such rubbers as are



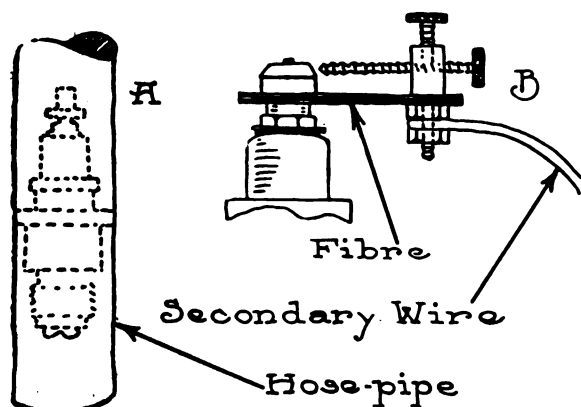
A Simple Device for Attaching a Sign to the Windshield.

to be found upon the porcelain stoppers of certain kinds of bottles. The screws should fit snugly, wire should be wound around the threads that project and the ends of the wire should be formed into hooks, as at A. Coat the rubbers lightly with glycerine and then stick them onto the windshield, as at B. The vacuum created will sustain quite a heavy weight.

SPARK PLUG ATTACHMENT.

Spark plugs carried loosely in the tool box are liable to be broken by contacting with tools. A better plan for storing them is shown in Fig. A. Cut a section a trifle greater than length of the plug from a discarded garden hose. When the plug is forced into the center of the hose as illustrated, it is fully protected against damage.

Trouble due to faulty spark plugs can be practically eliminated by use of the device shown in Fig. B, which consists of a spark gap formed on an insulated base. The base, made of fiber, is attached to the plug in the same manner as is the secondary wire. The upright pin should be machined, as shown, and attached to the base, and to the bottom of this pin the secondary wire should be attached. The screw in the longitudinal position is for adjusting the gap, while the



A, Case for Carrying Spark Plugs; B, Spark Gap for Spark Plugs.

one in the upright position is for locking the first screw. The principle of this device is based upon the fact that if an electrical current is compelled to jump an air gap, it will seek the next gap even though there be an easier means of passage. This attachment should have a tendency toward producing the spark in the cylinder even if the porcelain of the plug should be broken.

Starters— Generators— Magneto—

We specialize in the repairing of all makes of Starters, Generators and Magnets.

We offer prompt and efficient service. Our location and facilities assures the highest quality work and prompt delivery to all parts of the east. All work guaranteed.

New England Service Representative Connecticut Ignition

All parts in stock. Parts list at request.

New England Sales and Service.

*Dayton Starting—Lighting System for
Ford Cars*

V. A. NIELSEN COMPANY

708 Beacon Street.

Boston, Mass.



Is Entirely a Mineral Oil

*and contains no Fatty
Substances to Injure
Gears and Bearings*

MANY common greases contain animal oils that develop acid and attack metal and destroy the smoothness of bearing surfaces. This condition greatly increases the wear and tear on bearing parts.

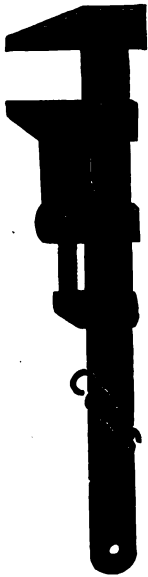
Caution: Be sure that you get genuine NON-FLUID OIL, put up in orange cans with the sprocket wheel trade mark on them.

Use "KOO" Special for gears. "KOOO" for bearings. At most dealers.

New York & New Jersey Lubricant Co.

165 BROADWAY, NEW YORK

COES *The Standard* WRENCH



WRENCHES that are made for the hardest service. They do not break but grip and hold and their efficiency never lessens.

Economy tools as they last longer, give better service and never become useless through wear.

Utility wrenches of the highest order for car owners and repairers as they can be used in compact places and once set hold like a vise.

*The Best Wrench
The Cheapest*

All dealers carry in stock the exact size to meet your need. They recommend Coes Wrenches as all good dealers have for more than fifty years.

COES WRENCH COMPANY
WORCESTER, MASS.

DIXON'S GRAPHITE Transmission and Differential LUBRICANT

The smoothest running cars, the easiest driving cars, the cars that operate most quietly, and stay in service the longest, are the cars whose transmission and differential gears operate in, and are continually protected by this specially prepared Dixon Lubricant.

Also ask your dealer about Dixon's famous Cup Grease.

Write for Booklet No. 210-G.

Made in Jersey City, N. J. by the
JOSEPH DIXON CRUCIBLE COMPANY
Established 1827



NEW DEPARTURE BALL BEARINGS



*Strength
Stamina
Service*



The New Departure Manufacturing Co., Bristol, Conn.
Conrad Patent Licensees

CORRECTING PISTON SLAP.

(C. F. S., Chicago, Ill.)

The pistons in my four-cylinder Ford engine are quite loose, making a piston slap. I thought of taking the pistons out, grinding the cylinders and putting in new pistons that would fit snug. But I do not know just how to go about it. What kind of grinding compound should I use and should the rings be left on? In case I should have to rebore the cylinders could they be ground, using the old pistons?

When a cylinder is scored, or a piston slap occurs, due to excessive wear of the cylinder wall and rings, the only permanent restoration is to take your car to some good repair shop that has the mechanics and the tools to do the work. The four cylinders should be rebored and fitted with oversize pistons and rings. This will give you a permanent job, and will also increase the horsepower somewhat.

It is necessary to rebore and refit all four cylinders, otherwise you would have one or two extra powerful cylinders and the others would be normal powered, their throwing your motor out of balance. Where a cylinder is only slightly scored a mixture of some good grinding compound (not emery) and oil can be used, placed in small quantities on the piston so as to cause the film of compound and oil all over the surface. The grinding is by rotating the piston by hand for a few moments, then removing it and rubbing off the compound with a piece of waste. Then apply a new coat of compound and repeating the operation as many times as needed to complete the job. Do not under any consideration use emery for this work, as its particles will become imbedded in the walls of the cylinder. These cannot be removed by wiping with waste and will remain there, rapidly cutting the rings and piston and the cylinders. Better results will be obtained by lapping or grinding in the new pistons with the rings off, as the rings will fit the walls of themselves due to their being made so that they will expand and contract.

FORD CAR ENGINE STARTS SLOW.

(C. J. M., Pontiac, R. I.)

Can you tell me why it is that my 1917 Ford engine does not start when I make one turn of the crank? I find it necessary to give three or four quick sharp turns and use the primer for the first two turns before the engine will start. This I have to do even when the engine is warm. I must advance the spark to about the third or fourth notch and the throttle to about the seventh or eighth notch. After the engine is started it runs fine. I would like to know why the engine will not start with one turn of the crank.

From your description your Ford is probably the regularly magneto equipped car and you are not using batteries for starting. The conditions which you describe are no different from what other Ford owners have to contend with unless they have installed a starting battery, which may be either a set of four dry cells connected in series, or a lighting storage battery to which the ignition may be connected by a switch.

In starting a Ford engine if the magneto is used, the spark will require some advance, the degree depending upon the setting given the adjustment at the base of the rod at the ball joint. This will vary from car to car so that no set rule can be given. This point can be judged best by each individual owner.

It is always wise to open the throttle for several notches when starting the engine to supply plenty of gas, the setting depending upon the point where the engine will run without racing.

The reason for priming the engine when starting is that the gas is drawn from the carburetor more quickly than if the primer were left open, and a charge of gasoline is drawn into the combustion chamber of the engine, insuring a quicker start than if the regular mixture of gasoline and air were admitted. The quick sharp turn of the starting crank is necessary for the magneto to develop sufficient current for ignition.

(When Writing to Advertisers, Please Mention the Automobile Journal.)

SAVOLD

TIRE REBUILDING SYSTEM

*Nation-wide Service
To Motor Car Owners*

Buy Only the Better Tires Now

If you have been tempted to buy cheap tires, Mr. Car Owner, because the first cost of the better tire is a little more, ***now is the time to stop.*** A cheap tire like a cheap shoe does not stand repairing and rebuilding. Buy ***only*** the Better Tires now because:

They give you the greatest known mileage, and ***in addition***, under the SAVOLD rebuilding system, they give you this original mileage again, and in some cases, a third time — ***at half the cost of a new tire.***

The SAVOLD rebuilding system combines scientific production, volume, unlimited buying power and rigid control of workmanship.

The New York SAVOLD plant at 227 to 245 W. 61st Street is the most complete, scientifically equipped tire plant in this country. Plans are rapidly nearing completion for the operation of similar model plants in all important centers from Boston to San Francisco.

5 COLUMBUS CIRCLE

NEW YORK CITY

SAVOLD TIRE CORPORATION

TRADE MARK
EAGLEINE
 REGISTERED
**MOTOR
 OILS**



EAGLEINE OILS

are unequalled for motor lubrication, freer from carbon, economical because they protect the motor against mechanical wear, and the quantity required is comparatively small.

These are the claims of thousands of motorists,—some with years of experience, who want full value, and more who know the value of high grade lubricants, and who know when they obtain satisfaction.

EAGLEINE QUALITY IS INSURED TO YOU

A grade for every type of motor. It is sold in sealed containers.

*Let us send you our new book and chart.
 It is free at request.*

EAGLE OIL AND SUPPLY CO.
44-45-46 India Street, Boston, Mass.

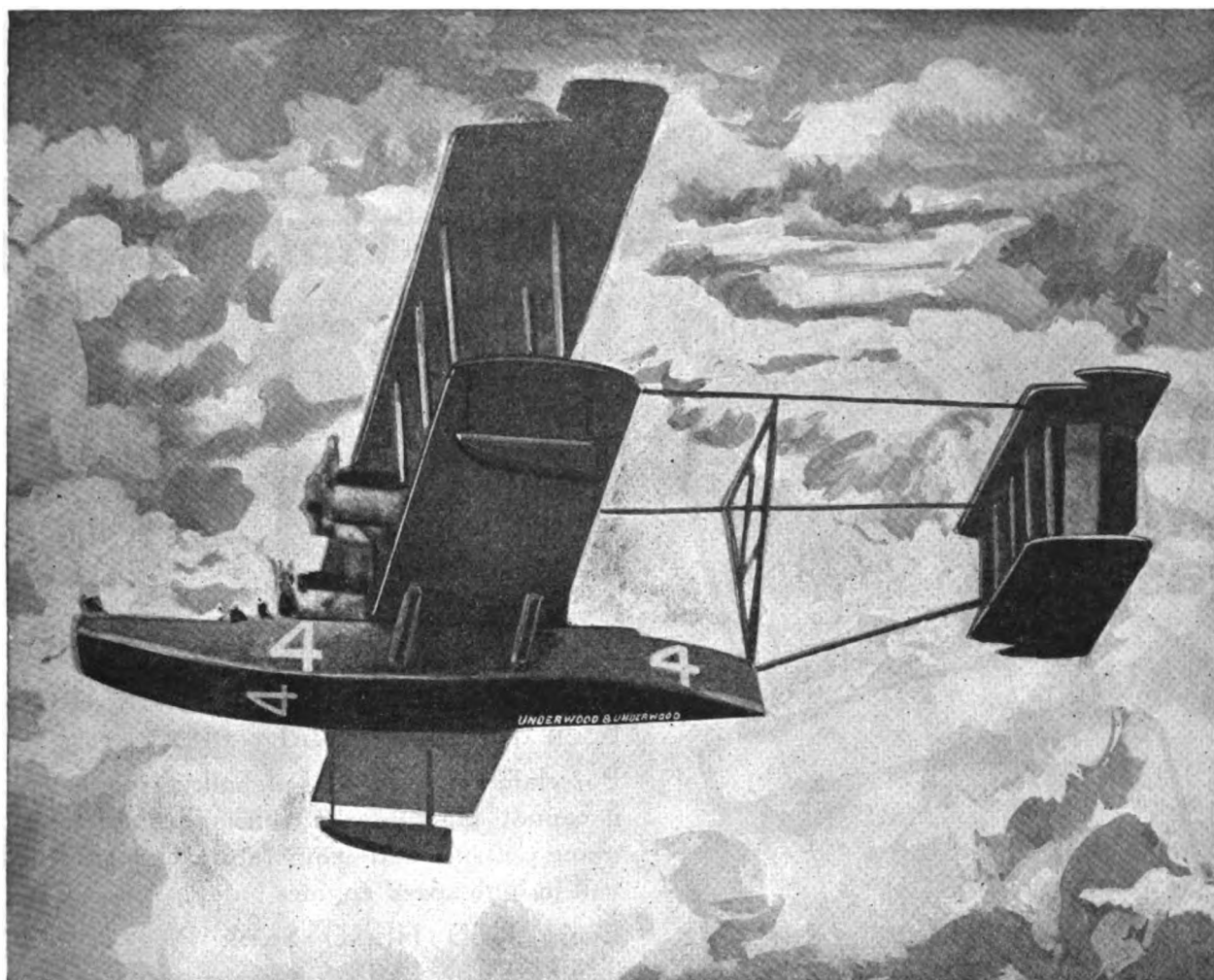
NEW YORK CITY
Woolworth Building

CHICAGO
1132 W. 37th Street

AUTOMOBILE JOURNAL

INDEX TO ADVERTISERS

	Page
Affa Specialty Co.....	6
Atlas Tire Co.....	58
Atwater Kent Sales Co. of N. E.....	7
Auto Products Co.....	6
Barrett Co., The.....	57
Barrett Motor Starter Manufacturing Co., Inc.....	60
Ben's Big Tire Shop.....	7
Boston Auto Tire Exchange.....	6
Boston Retread Tire Co.....	7
Bowling & Co.....	7
Brightman Auto Exchange.....	7
Broadway Tire Jobbers Co.....	7
Brown Spring Oil Co.....	8
Cambrin Tire Exchange.....	7
Coca Wrench Co.....	64
Connecticut Auto Parts Co., Inc.....	7
Culver-Stearns Manufacturing Co.....	61
Dixon Crucible Co., Joseph.....	64
Eagle Oil and Supply Co.....	2
Empire Hotel.....	56
Flaherty, Wm. H.....	6
Gastine Co.....	8
Grant Motor Car Co.....	62
Gulf Refining Co.....	3
Helsner Special Tool Co.....	62
Hood Tire Co.....	Cover
Hotel Empire.....	56
Hotel Wellington.....	61
Libben, M. & Co.....	6
Liberty Tire Co.....	7
Magneto and Generator Exchange of N. E.....	6
Magneto Shop.....	6
Metz Sales Corporation.....	60
Motalarm Corporation, The.....	59
National Can Co.....	62
New Departure Manufacturing Co.....	64
New York and New Jersey Lubricant Co.....	63
Nielsen Co., V. A.....	63
Paije-Detroit Motor Car Co.....	61
Pierce-Arrow Motor Car Co.....	Cover
Red Head Spark Plug Co.....	4-5
Reo Motor Car Co.....	10
Savold Tire Corp.....	1
Saxton Auto Accessory Co.....	6
Standard Oil Co. of N. Y.....	Cover
Strandway Auto Parts Co.....	7
Stokes Carburetor Co.....	8
Tremont Products Co.....	Cover
Wellington Hotel.....	61
Zenith Carburetor Co.....	60



There is *MORE POWER* in
THAT GOOD GULF GASOLINE
and **SUPREME AUTO OIL**

Manufactured by **GULF REFINING COMPANY, Pittsburgh, Pa.**

EFFICIENT, perfect and constant lubrication was the greatest factor in the ultimate success of the adventurous trip of the NC-4. Hence the Navy left nothing to chance. Grilling, practical tests, scientific investigation, exhaustive research, were all combined against the possibility

of disastrous engine troubles resulting from poor lubrication.

The choice of GULF LIBERTY AERO OIL, therefore, was made with a positive knowledge that it would fulfill every requirement, and the success of the NC-4 has proven the wisdom of the choice.

SUPPLIED BY
GULF REFINING COMPANY

Manufacturers of SUPREME AUTO OIL and THAT GOOD GULF GASOLINE

(When Writing to Advertisers, Please Mention the Automobile Journal.)

Red Head

the kind with the **Vitrystone** insulator

Spark Plugs.

**More
spark!
Less!
gas!**



Porcelain insulation for Spark Plugs has been tried and found wanting.

Porcelain is naturally of a chalky, fragile texture—it cannot continuously withstand sudden and extreme pressure and temperature changes that prevail in high speed engines today.

Every RED HEAD Spark Plug is Vitrystone insulated.

Vitrystone is a strong, rugged, synthetic Stone, and is made by us in our own pottery from carefully selected clays.

Vitrystone is the only known plug insulator that continuously withstands the intense heat and high compression common to the modern high speed engine without fracture or short-circuit.

Initial order of 50 to 100 plugs brings to you our Red Head sales cabinet — it looks good on the counter and makes plug sales easier.

Red Head Spark Plug Corp
261 Broadway New York



Red Head

the kind with the **Vitrystone** insulator

**More
spark!
Less
gas!**

Spark Plugs.



Big Boy
 $\frac{1}{2}$ " $\frac{1}{2}$ " $\frac{1}{2}$ " long
 $\frac{7}{8}$ " $\frac{1}{8}$ " $\frac{1}{2}$ " long
 and Metric
 Retails at \$1.25

Every RED HEAD Spark Plug is doubly tested and triply strong.

Every RED HEAD Vitrystone insulator is pottery and factory tested—first, for structural faults; secondly, for resistance to **three times** the service voltage in an automobile ignition system.

And before a RED HEAD is packed for delivery it is again carefully tested and regulated to assure perfect plug performance. Compare this with the usual 2% spark plug factory test (two plugs in every hundred tested.)

The result of this carefulness in testing and assembly is that every RED HEAD Spark Plug goes to the dealer in perfect condition—and will stand up to the intense heat and high compression of the modern gas engine without fault or failure.

There's a RED HEAD Plug to fit any plug purpose or need. For Ford Cars, the RED HEAD "Long Body" is a custom-maker. Retails at 75 cents.

Red Head Spark Plug Corp
261 Broadway New York



TRADE OUTLET

At 304
**Columbus Ave.
For K-E-E-P-S**
304

Selling Slightly Used Tires. The Largest Stock in the East. "Your Money's Worth or We Make Good." Remember Our Prices Will Interest You.

Size	Tires	Size	Tires
30x3	\$4.50 down to \$2.40	33x4 1/2	\$12.00 down to \$6.00
30x3 1/2	6.50 down to 3.40	33x5	14.50 down to 8.00
32x3 1/2	8.75 down to 3.90	35x4	10.50 down to 9.00
31x4	8.00 down to 4.00	34x4 1/2	10.00 down to 6.00
32x4	8.25 down to 5.00	35x4 1/2	12.00 down to 6.50
33x4	9.00 down to 5.50	36x4 1/2	12.00 down to 6.00
34x4	10.75 down to 6.00	35x5	25.00 down to 6.90
32x4 1/2	12.00 down to 7.00	36x5	12.00 down to 8.00
		37x5	14.00 down to 6.00

USED TUBES, ALL SIZES, AT \$1.50 TO \$2

MAIL ORDERS given prompt attention. Tires sent C. O. D. with privilege of examination. 5% discount if cash or money order comes with order.

BOSTON AUTO TIRE EXCHANGE
304 COLUMBUS AVE. TEL. B. B. 7329

Magneto and Generator Exchange of N. E.

44 COLUMBUS AVENUE, BOSTON, MASS.

SAVE 50%

Offers

Quality Service for your car.

Starting, Lighting, Ignition.

One year guarantee on repairs and installations of all makes.

Everything pertaining to Auto, Electricity, Magneto and Generator Parts. We have one of the best equipped shops in New England devoted exclusively to this work.

BOSCH, SPLITDORF, EISEMANN, DIXIE, BERLING MAGNETOS
and Parts Always in Stock.



Tires Guaranteed 5000 Miles

30x3 plain	\$8.00
Non-Skid	\$10.00
30x3 1/2 plain	\$11.00
Non-Skid	\$13.50

Big saving on other sizes and tubes also. Trade in your old tires. 20% deposit required on C. O. D. orders.

Write for lists to

M. Liben & Co.

793 J 7th Ave., New York City.

Save 25% Gasoline. Eliminate Carbon.
Reduce Operating Cost. Use

"MOTOROL"
Trade Mark.

Let Us Send You the Evidence.

AUTO PRODUCTS CO.,
226 W. 138th St., New York.

SALESMEN AND DEALERS—A million Ford owners are waiting for you to show them the only safety steering attachment; takes that jerk out of the Ford steering wheel and makes it steer like a Packard; pays for itself in tire saving; put it on your car and dozens want it; if you have small capital and can put canvassers out to sell the owners, selling yourself to the trade, you can make a small fortune. Write today. Saxton Auto Accessory Co., Inc., 347 Fifth Ave., New York City.

Magneto Repairs

Skillfully Done. Assured Satisfaction. Prompt Service.

The repair work turned out of this shop is of the highest merit—because I know how. If you have electrical and magneto troubles, no matter whether it is a

BOSCH, SPLITDORF-EISEMANN, or any other make, I can fix them. My well-appointed plant, coupled with skilled workmen, assures you of expert magneto service. Send in your magneto. 24-hour shipment.

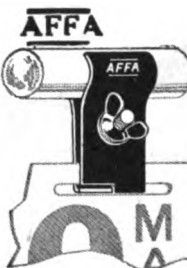
Rebuilt Magnetos, Platinum Parts, Generator Brushes, Bearings, Etc.

Correspondence Invited.

The Magneto Shop

JOHN BRUNSWICK,

187 Massachusetts Ave., Boston, Mass.



SPECIALTIES for the Ford

They stop the rattle in—

The Brake Rod Supports for 35c.

The Brake Rod Clevises for 50c.

The Spark and Throttle Rods for 25c.

The Steering Spindles for 50c.

They serve many other useful purposes and are

inexpensive. **JOBBERS**, write for prices and folder which mean money for you. **Affa Specialty Co.,** 34-D Southbridge St., Worcester, Mass.



BOSTON'S Finest Equipped Auto Electric Repair Service

With a staff of trained electrical men we can offer auto owners expert service, coupled with promptness and personal attention to all electrical repair problems. We also repair any electrical equipment used on a motor car. Official service and parts representative for

AUTO-LITE LIGHTING AND STARTING SYSTEMS.
Complete Stock of GENUINE PARTS.

All Work and Parts Guaranteed.

William H. Flaherty Co.

74 CUMMINGTON ST., BOSTON, MASS.

(When Writing to Advertisers, Please Mention the Automobile Journal.)

TRADE OUTLET

TIRES

JOB LOTS

Obsolete, Surplus Stocks and
Factory Seconds

WRITE—CALL

BROADWAY TIRE JOBBERS

250 West 54th Street

New York

AUTO SAVE 50-90% PARTS FOR 400 CARS

POPE, PACKARDS, PIERCE, BUICK,
STEVENS-DURYEA, KNOX, OVER-
LAND, ETC.

Motors, \$25.00 up	Presto Tanks, \$4.50 up
Magnetos, 4.00 up	New Spotlights, 2.00 up
Carburetors, 8.00 up	Generators, 10.00 up
Rear Axles, 15.00 up	Gears, 1.00 up
Front Axles, 5.00 up	Bearings, 1.00 up
Cylinders, 5.00 up	Radiators, 10.00 up

\$12 Diamond Bumpers.....\$5.50

Jobbers in Bankrupt Auto Supplies.

BRIGHTMAN AUTO EXCHANGE

321 Windsor Ave., Hartford, Conn.

AUTO PARTS.

50% to 90% Off List.

24 Hour Service. Unlimited Stock.

Pope-Hartford, Columbia, Reo,

Overland and 200 other makes.

Motors, \$20.00 up	E. Presto Tanks, \$4.00
Magnetos, \$3.50 up	B. Presto Tanks, \$4.75
Cylinders, \$3.00 up	Bearings, 50c up
Springs, \$1.00 up	Rims, \$1.00 up

1000 Other PARTS Bargains.

If you want any part not listed here,

Write Us—We Have It.

Conn. Auto Parts Co., Inc.

1070 Main St., Hartford, Conn.

Atwater-Kent Sales Co., of New England

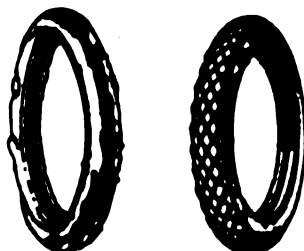
883 BOYLSTON ST., BOSTON, MASS.

Official
SALES AND SERVICE
For New England.

Complete stock of parts always
on hand.

Write for Price List.

BOSTON RETREAD TIRE CO.



Before

After

OUR METHOD OF RETREADING IS
DIFFERENT FROM OTHERS.

We use all Goodyear first quality stock
and retread bands and can absolutely
guarantee from

3000 to 3500 Miles.

We will replace a new tire for every
one that our work does not give satis-
faction.

Tires called for and delivered. We pay
express charges one way on all out-of-
town orders.

Price List Mailed Upon Request.

BOSTON RETREAD TIRE CO.

70 Clarendon St., Boston, Mass.

AUTO PARTS—At Your Own Prices.
We can supply parts for nearly every
make of car. 648 Packards, Interstate
Fours, also Truck parts, GMC and
other makes.

Write us for Parts. We have them.

STRANDWAY AUTO PARTS CO.,
192-195 H. St., South Boston, Mass.

We Are Exclusive
SELLING AGENTS
for the N. F. G.

CARLISLE CORD TIRE.

Dealers write for our special propo-
sition.

CAMBRIA TIRE EXCHANGE.

204 Columbus Ave., Boston, Mass.

TIRES AND TUBES

Demonstrating and Factory Repaired.

Economy, Qual-
ity, Price. All
Standard
Makes.

Size	Tires	Tubes
30x3	\$5.00	\$1.35
30x3 1/2	6.00	1.45
32x3 1/2	6.50	1.50
31x4	7.25	1.65
32x4	8.00	1.60
33x4	8.75	1.70
34x4	8.75	1.70



No Junk. Satis-
faction Guar-
anteed.

Size	Tires	Tubes
36x4	\$9.00	\$1.75
34x4 1/2	9.25	1.75
35x4 1/2	9.50	1.80
36x4 1/2	9.75	1.85
35x5	10.50	2.00
37x5	11.00	2.20

Write for Prices on Odd Sized Tires. TERMS:
\$1.00 deposit with each tire ordered, balance C.
O. D. subject to inspection. Specify style of
rim to avoid delay. Although used tires are not
guaranteed for any definite number of miles,
we guarantee our tires to give the best
service in proportion to the prices paid, or rea-
sonable adjustments are made.

LIBERTY TIRE CO., 2119 So. Michigan
Ave., Dept. I, Chicago, Ill.

H. Gordon, Ltd., 8a City Road,
London, are open to take up
the SOLE AGENCY of
leading American
Firms for

Light Motor-Cars and Access-
ories, Motor-Cycles and Ac-
cessories, Leather Belting.

References: Messrs. Bowring & Co.,
Battery Place, New York City.

Classified Advertising BRINGS BIG RETURNS

20 Cents a Line, Seven Words to Line.

Don't discard your Old Tires, use self-
cured Blow-Out Patches. They weld
permanently. Extra long and strong.
Easily applied. Double mileage as-
sured. The outcome of years of re-
search. Send for particulars. BEN'S
BIG TIRE SHOP, Dept. M, 378-382
Queen's Blvd., Winfield, Long Island.

(When Writing to Advertisers, Please Mention the Automobile Journal.)

CUT DOWN YOUR GASOLINE BILL 30%

GASTINE



TRADE MARK
REG. U.S. PAT. OFF.

"GASTINE" is GUARANTEED to give you 30% more mileage, preventing formation of carbon and assuring easier hill climbing ability, faster ignition and greater power.

A Gas Saver—Carbon Destroyer—Power Producer

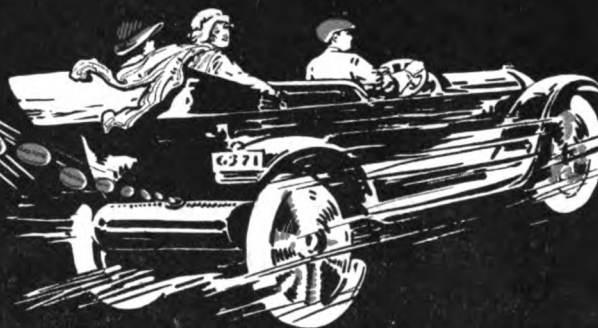
Keeps spark plugs clean. Absolutely harmless. Sold in concentrated form—easily dissolved in gasoline. 100 tablets in a box.

Used successfully throughout the civilized world.

"GASTINE" is endorsed by the National Ford Owners Club, Inc., N. Y., U. S. A., Certificate No. 978. Tested and endorsed by Kenneth Weeks, P. D., and Leading Institutions Universally.

SOLD WITH A MONEY BACK GUARANTEE

MORE "PEP" IN YOUR MOTOR



THE GASTINE COMPANY, BRIDGETON N. J. U.S.A.

Canadian Distributor

ROBERSON & MURPHY,
423 Coristine Bldg.,
Montreal, Canada.

ARTHUR G. NASON SALES CO.,
416 Montgomery St.,
San Francisco, Cal.

COWARD AUTO SUPPLY CO.,

222 Eliot St., Boston, Mass.
KING HARDWARE CO.,
Atlanta, Ga.
JOHN K. GEWINNER CO.,
Atlanta, Ga.
AMERICAN MOTOR CLUB,
(Six Stores) Philadelphia, Pa.

New England Distributor

WHITNEY SALES CO.,
511 Westminster St.,
Providence, R. I.

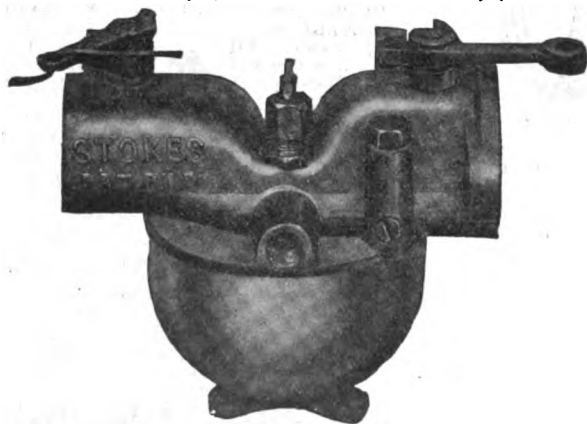
KEIN SUPPLY CO.,
1227 Market St.,
Philadelphia, Pa.

Dealers write for prices. Some territory still open. If consumers or dealers cannot be supplied from their jobber or dealer, they can order direct from this office. Always give name of their jobber or dealer.

STOKES Dual Carburetor

Undreamed of Power and Economy

FORD CARS, \$15.00 DODGE, \$16.00



Simplest and Most Effective Carburetor in the World.

Made for all cars up to and including 1 1/4" vertical manifolds.

Dealers—Write for official service station proposition.

STOKES CARBURETOR CO., Inc.

384 East 133rd Street NEW YORK CITY

New England Distributors,
V. A. NIELSEN CO., 708 Beacon St., Boston, Mass.

FULL SPRING ACTION

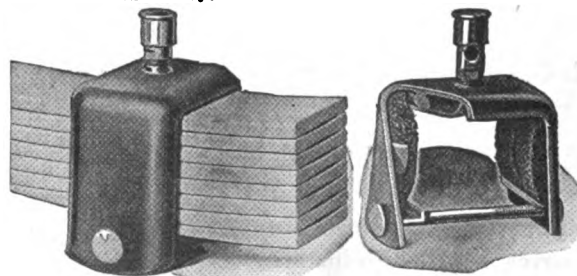
Absorbs all road shocks
Protects chassis mechanism
Insures riding comfort
Increases fuel and tire mileage
Decreases operating and maintenance cost

Spring Rusting Is Certain

It is the greatest and most general cause for car deterioration.

BROWN SPRING OILERS

Are a positive protection of any automotive vehicle. They contain oil reservoirs that automatically lubricate the springs to the exact degree that will insure full resiliency.



Can be installed by any owner. Sold by all dealers with ironclad guarantee of satisfaction.

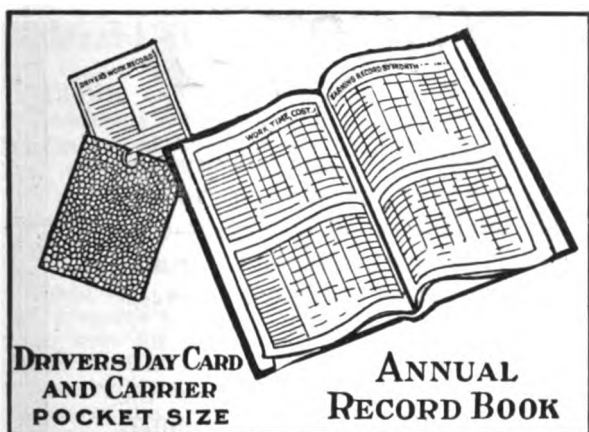
Booklet on car and spring care sent at request.

Brown Spring Oiler Company

6913 CARNEGIE AVENUE, CLEVELAND, OHIO

Know what it costs to Run your Truck
Learn what your Truck Earns
Know your Truck Profit and Loss

UNIVERSAL MOTOR TRUCK ACCOUNTING SYSTEM



The system includes an annual record book, 350 drivers' day cards, a day card carrier and full instructions.

Any owner can start this system at any time with an old or new truck of any make or type.

Any boy or girl clerk can maintain all records for one or a hundred trucks.

Each system is good for one year, nothing more is needed or necessary.

The records show at a glance any and all items entering into the earnings and cost of operation.

It is extremely simple. 100% complete and full working instructions are supplied with each system.

It is almost self-operating.

Price \$10 — Delivered

Address Record Department

MOTOR TRUCK

Pawtucket, Rhode Island.

AUTOMOBILE JOURNAL INDEX TO CONTENTS

Published Monthly by the
AUTOMOBILE JOURNAL PUB. CO.
 Times Building, Pawtucket, R. I.

WILLIAM H. BLACK.....Treasurer
DAVID O. BLACK.....Secretary

Branch Offices: New York City, Chicago, Detroit,
 Boston, St. Louis, Cleveland.

SUBSCRIPTIONS:

United States and Mexico (Postage Paid) the year \$1.50
 Canada\$2.50
 Foreign Countries in Poston Union.....\$3.50
 The Copy.....20 Cents

PARTIAL LIST OF CONTENTS

	Page
National War Against Auto Thieves.....	11
Big Demand for Enclosed Cars.....	15
Improper Hand Signals Confuse.....	16
Autumn Fashions for Motoring.....	17
Combines Magneto and Generator.....	19
How to Overhaul the Reo.....	20
Motor Truck in Unusual Feat.....	25
Design for Private Garage.....	27
Automobile Starting, Lighting and Ignition Systems	28
Passenger Car Specifications.....	36
Accessories Department.....	38
Utilitor Tractor Fills Real Need.....	48
Humorous Side of Motoring.....	49
Plan Big Increase in Car Production.....	50
Auto Census in Principal Cities.....	50
New Velie Six Models Announced.....	51
New Leach-Biltwell Car.....	51
Automobile Associations.....	52
New Gray "Victory" Motor.....	53
Authentic Tractor Operating Records.....	54
White and Howard to Build Car.....	56
Queries and Answers.....	57

**REO**

Drivers Idolize the Reo "Speed Wagon"

WHEN A MAKER CAN WIN the enthusiasm of drivers—not in occasional cases, but practically without exception—he may feel he has produced something pretty nearly approaching perfection.

THAT IS THE CASE with the Reo "Speed Wagon"—the first, and still the model, of its class.

ASK ANY DRIVER you see on a Reo "Speed Wagon," and note not only his words, but the confident enthusiastic tone of his voice when he says, "It is the best motor truck ever made."

ASK HIM what other makes of motor trucks he has driven—when, in what kind of service and how long.

ASK HIM THE PRICE of those others—and compare with the price of this Reo.

ASK HIM about the relative dependability of Reos and others.

ASK HIM ABOUT load capacity; and question him particularly as to how the different makes of trucks—their springs, frames, axles and motor—stand up under conditions of excessive overloading.

AND FINALLY, ask him about the relative cost of upkeep of the different makes he has driven.

HIS REPLY to that query will sell you a Reo "Speed Wagon."

IF PERCHANCE he has driven trucks of about the same size and capacity, but for which you are asked to pay twice the price of a Reo, ask him about dependability and upkeep, and he will tell you you need pay no more than the price of a Reo to obtain the utmost service and the least in cost of upkeep.

HIS BOSS WILL TELL YOU that the cost per ton-mile of transporting via Reo "Speed Wagon" is almost unbelievably less.

Reo Motor Car Company
Lansing, Michigan

"The Gold Standard of Values"

(When Writing to Advertisers, Please Mention the Automobile Journal.)

National Crusade Against Automobile Thieves

Federal Law Provides Heavy Penalties for Crossing State Lines with Stolen Cars

VIGOROUS and concerted action is now being directed against the automobile thief and in the near future, it is expected, national legislation, backed by strong state laws, will make the stealing of cars a decidedly precarious "profession."

The professional automobile thief is now looked upon as a merciless bandit, always prepared to kill anyone who interferes with his crimes. Newspapers daily tell of violence used by this class of thieves, who seldom go unarmed.

Because of the simplicity with which he can flee to comparative safety by crossing a state line after committing a theft, it is the consensus of opinion that the only effective way to get at him is through congressional action that would make his act a federal offense.

The National Automobile Chamber of Commerce is backing the Dyer bill, now pending in Congress, which makes it a felony to take a stolen car from one state into another, punishable by fine and imprisonment.

According to figures furnished by the American Automobile Association, 22,273 cars were stolen in 1918 in 19 western cities. Detroit led with 2639 thefts, followed by Chicago with 2611, St. Louis with 2241 and Cleveland with 2076. Cincinnati suffered least with 348. Kansas City led in the percentage of 54 per cent. of stolen cars regained.

Several states have passed stringent anti-theft laws, notably Pennsylvania, where the penalty for stealing is a fine not to exceed \$5000 and imprisonment of separate or solitary

confinement at labor not exceeding 10 years.

The Dyer bill, which is a substitute for a former bill of the same subject, will be known as the national motor vehicle theft act, and defines a "motor vehicle" to include any automobile, wagon, motor-cycle or any other self-propelled vehicle not designed for running on rails. The teeth of the bill are in the following reference to the knowing sale, transportation or use of any stolen vehicle in interstate or foreign commerce, which is not affected by various state laws now in force against automobile thieves:

"Whoever shall transport or cause to be transported in interstate or foreign commerce a motor vehicle, knowing the same to be stolen property, or who shall receive, conceal, store, barter, sell or dispose of any motor vehicle, knowing the same to have been stolen and transported in interstate or foreign commerce, shall be punished by a fine of not more than \$5000 or by imprisonment of not more

than five years, or both.

"Any person violating this act may be punished in any district in or through which such motor vehicle has been transported or removed by such offender."

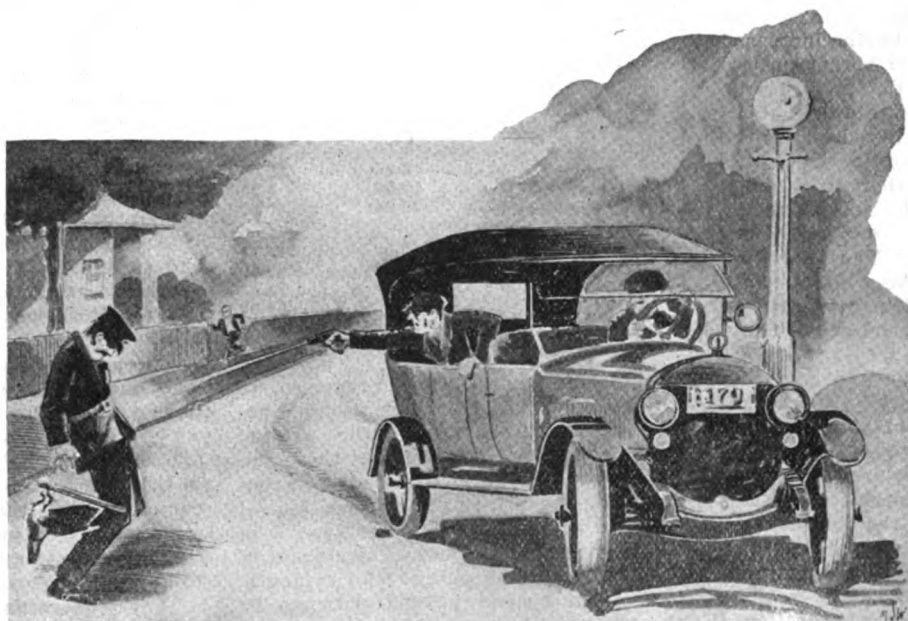
Insurance companies report automobile thefts aggregating \$35,000 per day, but their figures are based on insured cars only. Theft insurance, owing to its excessive rates, is used by only 40 per cent. of motorists. Hence, correct losses by theft are in the neighborhood of \$75,000 per day or \$27,000,000 per annum, a burden which the motorist, of course, is compelled to bear.

No other form of crime remotely compares with automobile thievery for profit and freedom from conviction. Horse thieves whose punishment was summary indeed, never in their palmiest days dreamed of such vast loot as this, nor did all the bank robbers and highwaymen from Jesse James on down ever collect in the aggregate such stupendous rewards for all their dare-devil deeds. It

is said that many of the stolen cars are being exported.

In some places car owners have organized to protect their cars, just as horse owners banded together years ago. In Austin, Tex., an Anti-Automobile Theft Association of Texas was recently incorporated.

How state officers are powerless to cope with the stolen car situation, making Federal jurisdiction over automobile thefts imperative, is strikingly brought out in a communication to the National Automobile Dealers' Association from the American Automobile Insurance Co.,



The Professional Automobile Thief Never Hesitates to Shoot Those Who Interfere with His Crimes.

St. Louis, Mo. The company writes insurance in 22 states. This company is lining the insurance organizations up solidly to support the Dyer bill in Congress.

State Feud Aids Thieves.

A critical situation now exists between Memphis, Tenn., and several northern Mississippi counties which nearly resulted in the lynching of the Memphis chief of detectives and his aide. An agent for the insurance company located 25 stolen Ford cars in Mississippi and succeeded in bringing back four of them. This agent, accompanied by Detective Boll of Memphis, went to Senatobia, Miss., to recover a stolen car.

"As to getting co-operation," the agent writes, "it is impossible. The sheriff absolutely refuses to do anything, stating that he is tied up in local politics, and that he has a wife and children, and that he has been threatened, in fact, some one fired a shot at him. He showed us a bullet through his hat. The mayor refuses to do anything and there are a couple of constables there, but they say they have nothing to do with the automobile stealing and do not intend to get mixed up in it."

According to the Memphis agent of the insurance company there are hundreds of stolen Tennessee cars in Mississippi which cannot be recovered because the Mississippi officers refuse to take any steps to aid the owner in recovering from Mississippi citizens.

"Such a condition as this," states C. A. Vane, attorney for the National Automobile Dealers' Association, "will not be possible under the Dyer bill giving the Federal courts jurisdiction over these cases."

How thefts of automobiles have boosted theft insurance rates, in some cases nearly 2000 per cent. in five years, is shown in a report to the National Automobile Dealers' Association by the Automobile Insurance Co. of St. Louis from records compiled in St. Louis. The report reveals that the owner of the small, light, cheap cars suffers principally at the hands of automobile thieves, the rates on the larger cars having increased only slightly. Cities that border on two or more states are the most fertile fields for automobile thieves. Cars stolen in one state are driven across the line and then the state in which the car was stolen is powerless to summon as witnesses the parties to whom the stolen cars are sold. To correct this condition, Representative Newton of Missouri has a bill which he will introduce to make it a Federal offense to steal an automobile in one state and drive it into another.

Frank Oliver, chief clerk of the City Magistrate's Courts, New York, who has made a special study of the car theft problem, says:

"How shall we recapture the stolen automobile? Is the problem serious enough today to justify the concentrated attention of the automobile public, manufacturers, licensing authorities, insurance companies and police officials?"

"In answering the second question I find, from the reports of the police authorities of the 100 largest cities in the United States, that the traffic in stolen automobiles has grown to an astonishing

degree. It is not unusual in small cities to find on the police records reports of 30 or more stolen in a month. In New York City an estimate of 300 a month was declared conservative. In the city of Detroit in 1917 over 4000 cars were reported stolen.

"A few days ago I turned over the pages of the newspapers in the public library and found that every large city in the country had under foot some plan to deal with the problem. A police official in San Francisco advocated the establishment of block houses on all high-

How Thefts Boost Insurance Rates

This table shows how theft insurance rates on automobiles have been increased:

ST. LOUIS.		
	1915	1919
Buick	\$4.25	\$45.13
Cadillac	12.00	30.00
Dodge	3.75	35.63
Ford	2.75	42.63
Packard	12.50	18.75
Pierce-Arrow	21.50	32.25
KANSAS CITY.		
Buick	\$4.50	\$42.75
Cadillac	9.00	22.50
Dodge	3.75	35.63
Ford	2.00	31.00
Packard	12.00	18.00
Pierce-Arrow	23.50	33.75
CHICAGO.		
Buick	\$3.75	\$35.63
Cadillac	9.50	23.75
Dodge	3.50	33.25
Ford	1.75	27.13
Packard	17.50	26.65
Pierce-Arrow	24.50	36.75
DETROIT.		
Buick	\$7.50	\$71.25
Cadillac	9.00	22.50
Dodge	3.50	33.25
Ford	1.50	23.25
Packard	20.00	30.00
Pierce-Arrow	20.00	30.00
DENVER.		
Buick	\$3.75	\$24.13
Cadillac	5.00	17.00
Dodge	2.50	16.25
Ford	2.00	21.00
Packard (1914)	15.00	15.00
Pierce-Arrow	20.00	20.00
MEMPHIS.		
Buick	\$4.50	\$27.00
Cadillac	7.50	9.00
Dodge	3.50	21.00
Ford	2.00	22.50
Packard	12.50	6.25
Pierce-Arrow	20.50	10.25
WICHITA.		
Buick	\$2.50	\$47.50
Cadillac	4.50	22.50
Dodge	3.75	35.63
Ford	2.25	34.88
Packard	22.50	33.75
Pierce-Arrow	19.25	29.88

ways leading out of San Francisco, to which flashes might be sent of stolen automobiles. He advocates the arming with shot guns of policemen at these stations, who would be ordered to shoot down anyone refusing an inspection. I cite the last instance, not as typical of what should be done, but as significant of the temper of the police, who evidently have been goaded beyond patience by the successful escape of thieves.

Carelessness in Parking.

"People at summer resorts, bathing places, ball grounds, park their cars for two, three and four hours without a

supervisor. A thief has all this time in which to work. Patent locks seem to be a delusion and an invitation to carelessness. Only a few days ago, in front of the New York Athletic Club in New York City, a motor truck drove up, lifted the front wheels of an automobile upon it, and towed the car away as if taking it to a repair shop. The driver of the motor truck was a thief. Women while shopping park their cars in the public streets sometimes three or four blocks away from the stores. Often these cars are missed on their return. Everything has contributed to the ease with which the thief might make a getaway. Therefore I maintain that the problem is great enough for intensive study and concerted action.

"It is essentially an interstate problem. The facility with which a car may be driven into another state and there relicensed, furnishes the most successful method of disposing of a car. Therefore, my proposed solution of the problem comes through interstate channels.

Defects in Licensing.

"But what is the defect in state licensing systems? I do not know of any better way of pointing out the defects than by citing the recent law of the State of Pennsylvania, which seems to have reckoned with the defects of the past by guarding against them for the future. It calls first, for a personal inspection by the police or licensing authorities of every automobile for which a license application is filed. The application must show the complete identity of the car and the car is checked up against the identification. The application is checked up against reports of stolen cars. Second, every repair shop, second hand dealer and garage in the state must report on forms provided by the commissioner of motor vehicles, every job done on a car. Third, a bill of sale must be exhibited by the seller and given to the purchaser of an automobile. Fourth, if a car has a defaced motor number or a defaced identification mark on any of its parts explanation must be made by the owner before a license is granted to him. The state, if satisfied, will put its own motor number on the car and grant a certificate showing that the number was put on under official authority. Fifth, adequate penalties are provided for the enforcement of these provisions of the law.

"Are the laws of other states as rigid and sensible? Many states will grant a license to any one who applies and pays the fee. The license plates will be mailed to the applicant. The motor number given on the application may be fraudulent, but the state will not check it up. In fact, the application may be for a car which does not exist. The name of the applicant may be the alias for a crook. In this way a crook who plans stealing a car can get all the license plates he desires merely by paying a small fee, and thereafter he may attach license plates to any car he steals.

Records Incomplete.

"Many states, in publishing the list of licensed motor vehicles, publish only the name of the licensee and the license number. They do not publish the name, the year, the type of car, nor any of its

identification marks. The result is that police officials who subscribe to these lists for the purpose of identifying cars which have been stolen find them of no avail, and, on the other hand, of great assistance to the thief.

"Many states do not require that a bill of sale be given by each seller to a purchaser. Of course, the bill of sale given should be the bill of sale issued by the automobile company that sold the car in the first instance, otherwise it might be easily faked or forged.

"Very few states, in fact, I believe Pennsylvania is the only state, to undertake the task, inspect the automobile for which a license is applied. Therefore a license issued by the state means nothing except that a fee has been paid. It does not identify either the owner or the car and is evidence only that the public treasury has received its bit.

"The index systems of state licensing officials are not kept up. Every state authority ought to have cross indexes by which license numbers, owners' names, manufacturers' names, types, years, motor numbers, etc., might easily be checked up with new applications. Such a system as this might seem complicated, but, as a matter of fact, seven or eight girl typists can accomplish the whole task in any state without being overburdened.

Value of Index Systems.

"A car might be stolen in one state and be licensed in another without the slightest difficulty. This is because state licensing authorities have no medium of exchange for information about the cars already licensed, together with their descriptions, and cars stolen together with their descriptions. Probably every business man has a prejudice against a complex index system, but there is no business man who needs one that does not avail himself of it despite the possibility of mistakes and the cost of maintenance.

"If state authorities would look for a moment into the index systems of great corporations upon which are registered costs of operation, daily business, bank dealings, information about competitors, complete history of employees, stock on hand, etc., they would look at the problem of registering in a sensible and complete way automobiles which have been licensed as a child's task. I venture the opinion, too, that the Census Department of the United States would undertake the registering of the numbers of cars issued by any state in the Union as a mere recreation when compared with the intricate statistics, reports, investigations, etc., that it records, compiles and publishes monthly. This neglected and essential part of public protection against theft is so simple that I can but marvel it has as yet not been properly and universally done.

How Auto Thief Works.

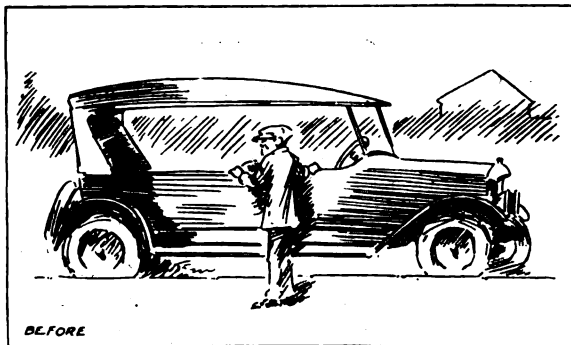
"The thief today operates in organized gangs. The village cut-up may steal a car for a few hours to give a thrill to a party of friends and leave it on the highway, there to be found by the police a short time after. He is not a thief, and of course, his follies are recorded in the list of stolen automobiles. The real thief seems to be the man able to take an automobile to a repair shop and there dis-

mantle it, being content with a profit on the sale of parts, such as tires, axles, wheels, batteries, etc. He is unwilling to take a chance on being found with an automobile that can be identified. He knows full well that hardly anybody can identify the parts of his car, because official record is loose and carelessly kept.

"There ought to be a law forbidding any man, under the penalty of a felony, from taking an automobile apart without permission of the commissioner in charge of licenses, except, of course, the original manufacturer whose business it is to do that of his own accord.

"A thief can camouflage a car, repaint it, change the touring body to a business body, put new fenders on it, put a Reo body on a Cadillac chassis, and send out on the road a freak which no man in the world can recognize under eye inspection as his own car. This requires the maintenance of large repair shops openly conducted or at least readily traced.

"The task of breaking up these gangsters must be left to the police, but the



police must be aided by official record so that, when parts of cars are found, they will have some way to trace them back to the report of a stolen car. Until the public realizes how much the 'shyster' garage keeper aids the car crook, no doubt he will escape severe penalty by courts and constant molestation by the police."

If the average car owner were asked whether he could identify his own car under any given circumstances, his impulse would be to return an unqualified and indignant affirmative. The police of any of our larger cities would disagree with him just as unqualifiedly.

As a matter of fact most car owners depend for identification on some scratch on the body, some broken screw in the chassis or some other equally uncertain factor. They do not stop to consider that our big manufacturers are turning out models in 10,000 lots that differ from each other in the slightest discernible degree. By the time a successful automobile thief has run a stolen car through his "service station" it will puzzle the most careful owner on earth to identify his vehicle.

An instance in point is found in the recent experience of a car owner in a middle western city who lost his car, a touring model of a popular make, and after some three weeks of anxious waiting was summoned to police headquarters to see whether he could identify a vehicle answering to his description of his lost car.

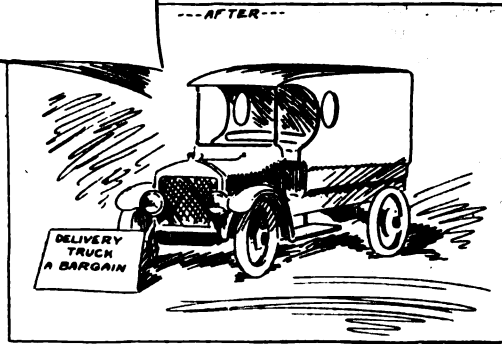
Arrived at the police station he found a small group of other owners, who had assembled to try and identify the same car to see which he had been summoned. The hopeful owner had a number of marks by which he felt confident he could prove his ownership of the vehicle.

There was a bent screw in one part of the chassis, a dent in one fender, a scratch of peculiar shape on the dash. The car with which he was confronted was undoubtedly of the same vintage as his lost boat, but unhappily it was painted a rich ultra-marine blue instead of the dark green that had graced his vehicle.

Precarious Identification.

The most earnest scrutiny failed to disclose any of the distinguishing marks on which he had relied. A slight chipping of the new coat of enamel revealed the fact that it had been put on over a previous coat of the dark green that our friend had described. But two of the other assembled owners had put in bids for dark green cars, and eventually one of them managed to identify the car by a chip in the gear-set housing. The identification was not particularly convincing, but in the absence of anything better it served to give the car to the owner who had been able to describe the imperfections.

As a matter of fact no car owner ought to depend



How the Stolen Car Is Camouflaged.

on any such casual identification as slight imperfections that may have accrued during the operations of the vehicle. When the professional automobile thief steals a car he takes it to what amounts practically to a rebuilding factory.

In many cases the entire mechanism is taken down and the different parts are redistributed with those from other cars of the same make and model to turn out what amount to new vehicles.

The only safe method of placing identification marks on a car is to place them on all the major parts of the mechanism. Perhaps the most satisfactory method of doing so is to place punch marks on the various units. All such marks should be put in places where they will not be readily discernible.

Permanent Marks.

For instance, on the inside of the axles, on the flywheel, on the upper side of the gearset housing. After the marks have been made they should be rubbed over with grease until they are as nearly in-

distinguishable as possible. The car owner can have a prick punch made with his initials on it in very fine type and with this it is possible to place identification marks on the various parts that will generally escape notice and yet remain permanently.

One owner has had the upholstery of his front and rear seats lifted up and has tacked his card on the wooden frame work of the seat. This is not at all bad, because the thief would seldom think to look in this location for an identification mark of any sort.

Another clever idea is to bore a few small holes a mere fraction of an inch into the frame work at a given place carefully measured from permanently located land marks. Then fill these holes with lead and smear the spot well with grease. If there comes a time when it is necessary to identify the car it is a simple matter to measure off the proper distance, scrape a little of the lead off and prove ownership of the car.

In some cases an owner has been able to identify his car by reason of some simple but ingenious mark so placed that it is apparently part of the car or equipment. Not very long ago the New York police recovered a stolen car and nabbed the thief at the same time. The car corresponded in every way to a description given by a certain bereaved owner except that it had recently been repainted in an entirely different color scheme.

At any rate the police summoned this owner to see if he could identify the reclaimed car as the one he had lost. He came to headquarters, looked the vehicle over, paying considerable attention to the dash, and turning to the detective in charge, said: "This is my boat all right, in spite of the fresh coat of paint."

"Have you any marks to identify it by?" asked the officer.

Clock Gives Proof.

"Yes sir," replied the owner. "My name is J. K. Smith, as you know. Just take a look at the face of that clock."

The officer looked. On the dial of the clock was the legend, "Brown Clock Company, Boston, Mass." In fine script beneath this maker's name was "Sold by J. K. Smith, Agent." The thief had accepted this as a bona fide agent's name instead of a really clever identification mark, which it was.

In a recent theft case in Boston, the owner of a stolen car was able to prove his ownership of a recovered car by means of his initials, which were engraved in each of the hub caps.

The individual owner can probably find a dozen distinctive ways of marking his car for possible identification, but the point is that this should be done because when a car has been stolen the police demand something more than say-so on the part of the owner before they return it to him. Be sure that there are more ways than one by means of which you can prove that your car actually is yours, in case you are ever unfortunate enough to lose it. By doing so, you will be in a position to give the police a good description of it in case it is stolen and thereby increase the chances of recovery.

GUARD YOUR CAR.

Auto theft insurance mounts while the evil of car stealing remains unabated. Everything should not be left to the police and insurance companies. Too many policy holders are inclined to become careless while they feel their own risk covered, which encourages car stealing and makes insurance premiums go higher. Every owner should have an effective lock and leave his car alone as little as possible. Vigilance on the part of owners will do more than all other agencies toward making the auto thief's calling unattractive.

Record is Smashed in Spectacular Race at Sheepshead

Two brothers, Gaston and Louis Chevrolet, warm rivals in the automobile racing game, fought a great duel on the Sheepshead Bay Speedway Sept. 20 in a 150-mile race in which there were the unlucky number of 13 starters. First it was Louis, then it was Gaston who led the field, but just before the finish of the 110th mile, when the two brothers were racing neck and neck, with the field behind them lapped, Louis' car, a Frontenac special, the same as his brother's, burst into flames and he was lucky to escape with his life. It was only quick wit and consummate skill at the wheel that enabled Louis and his mechanic, Kenneth Goodson, to escape without a roasting. As it turned out both of them were well scorched about the arms and legs, particularly the latter.

It was a day of thrills for the 40,000 spectators who watched the cannonading cars go careening around the track. They not only saw the record for 150 miles sent into the discard by the winner, but what all automobile racing followers are keen to see, they witnessed a couple of hair raising escapes from what seemed almost certain death. In the third heat of the 10-mile race Ralph Mulford came within a hair's breadth of going west when he broke a tie rod in trying to straighten out in a desperate spurt around the last bank, skidded down into the infield and then bucked up straight across the track in front of Ralph De Palma, who had to do some mighty quick thinking to escape him. Mulford looked like a sure winner when the accident happened.

This mishap did not daunt Mulford from going into the long distance event, but the best that he could do was to finish seventh. The time of the winner was 1h. 22m. 34 1-5s. The old mark was 1h. 26m. 14 91-100s. made by Ralph Mulford at Chicago, June 16, 1917, in a Hudson special. The rate of speed maintained by the winner was close to 110 miles per

hour. From the start it was a wild scramble with the man who couldn't make his car step along at 100 miles an hour, a mere selling plater, in the mad chase for the purse of \$2500 which was hung at the end of the swirl around the two miles of pine boards.

From the start it was a family affair. Ralph De Palma, record holder par excellence, met with a mishap in the first heat of the 10-mile sprint when he broke a connecting rod on the third lap and was forced to retire. He dug up a White special in time for the third heat, but he never had a chance. The summary:

One Hundred and Fifty Mile Race—	
Driver Car	H. M. S.
1, Gaston Chevrolet, Frontenac	1 22 34 1-5
2, Joe Boyer, Duesenberg	1 24 43 3-5
3, Ira Vail, Philbrin-Duesenberg	1 24 46
4, Art Klein, Peugeot	1 25 24
5, Toland Nicholson, Hudson	1 30 28 1-5
6, Denney Hickey, Stickle	1 31 35 1-5
7, Ralph Mulford, Duesenberg	1 33 06
7, William Vetere, Duesenberg	Called off
10-mile special (three heats). First heat—Won by Louis Chevrolet; second, Joe Boyer; third, Gaston Chevrolet. Time, 5m. 30 4-5s.	
Second heat—Won by Ralph Mulford; second, Louis Chevrolet; third, Gaston Chevrolet. Time, 5m. 24 1-5s.	
Third heat—Won by Louis Chevrolet; second, Gaston Chevrolet; third, Joe Boyer. Time, 5m. 30 2-5s.	

SANE OPTIMISM KEYNOTE AT SESSIONS OF M. A. M. A.

Although the recent two-day business sessions at the third annual credit convention of the Motor and Accessory Manufacturers' Association in Buffalo, N. Y., were devoted primarily to credit subjects, general conditions in the business world, and particularly the automotive industry, were discussed from all angles.

Sane optimism was the keynote and this attitude was unanimously reflected by the attendance of approximately 150 representative executives of the industry, including credit managers and general officers of leading automotive equipment companies throughout the country.

Charles E. Thompson, president of the association, made this statement concerning the convention:

"The automobile industry was never in healthier condition than it is today. The paramount problem before us is to maintain this health and safeguard this prosperity. Optimism is, of course, desirable and warranted, but it is likely to prove a snare and a delusion unless it is built firmly on sound business principles, and qualified by caution and prudence.

"Sane optimism is the predominate keynote among the leaders of the automotive industry today. This attitude was reflected in all the addresses and discussions at our convention."

EFFECT OF STEEL STRIKE.

The steel strike may seriously retard the automobile industry. There is a report that some of the big automobile plants will have to close down if the strike is not speedily settled.

UNUSUAL DEMAND FOR ENCLOSED CARS

Many Dealers Say They Can Sell All They Can Procure from Factories—Sedan Continues as Big Favorite—New Models Have Low Effect

THE demand for enclosed cars is unusually heavy this year and many dealers state that the number they can sell is limited only by the number they can obtain from the factories. A revival of the chauffeur-driven vehicle is noted. During the war owners dispensed with chauffeurs whenever possible and this resulted in an increase in the use of the owner-driven cars, mostly of the sedan type.

This year a large proportion of the sales of the higher priced cars are of those models in which there is a separate compartment for the driver. In many instances owners are purchasing cars in which the chauffeur's compartment is all enclosed, realizing that the driver feels the effects of inclement weather as much as the passengers. However, it often happens that when the chauffeur is first consulted he desires his cab only partially enclosed, because he prefers to stand the weather if he can have the greater freedom in driving.

Among chauffeur-driven vehicles the standard limousine easily retains its popularity with the majority of motorists, but the all-enclosed berlines and the landaulets have a strong following. The all-enclosed type that has a partition that is removable is a model that is growing in favor.

Sedan Remains Favorite.

Taking all makes and sizes of cars into consideration, the sedan is by all odds the most in demand of enclosed cars, for it is the family winter conveyance without rival. The body designers have exercised their skill to the utmost in the sedan and some of the finest examples of coach making are in cars of this kind.

Some of the manufacturers have made a change in the five-passenger sedan. In their

desire to get rid of doors, a constant source of rattles and squeaks, the designers formerly put one door on either side of the sedan and then had two single seats in front. They have discovered that passengers do not like to crawl around the interior of such conveyances, and the majority of the new models are coming through with four doors, two on either side, while the front seat goes straight across.

This method of building the front seats makes for greater rigidity of the body and gives more room in front for the driver and his companion.

The inclusion of the sedan models in the lowest priced cars brings the protection of the enclosed car within the reach of all motorists, and some of the most attractive designs are found upon low-priced chassis. An enclosed car that has come into prominence is the four-passenger coupe. Formerly the coupe was a two or three-passenger affair, but, for the same reason that the open runabout of the same size gave way to a considerable extent to the four-passenger car, the larger coupe has gained in popularity.

It is built generally with the driver's seat set a little forward for his greater convenience, with two seats in the rear and an auxiliary seat in the corner opposite the driver forward. The chumminess of this type makes it a rival of the four-passenger sedan, especially if the

need of more than two places is only occasional.

Have Low Effect.

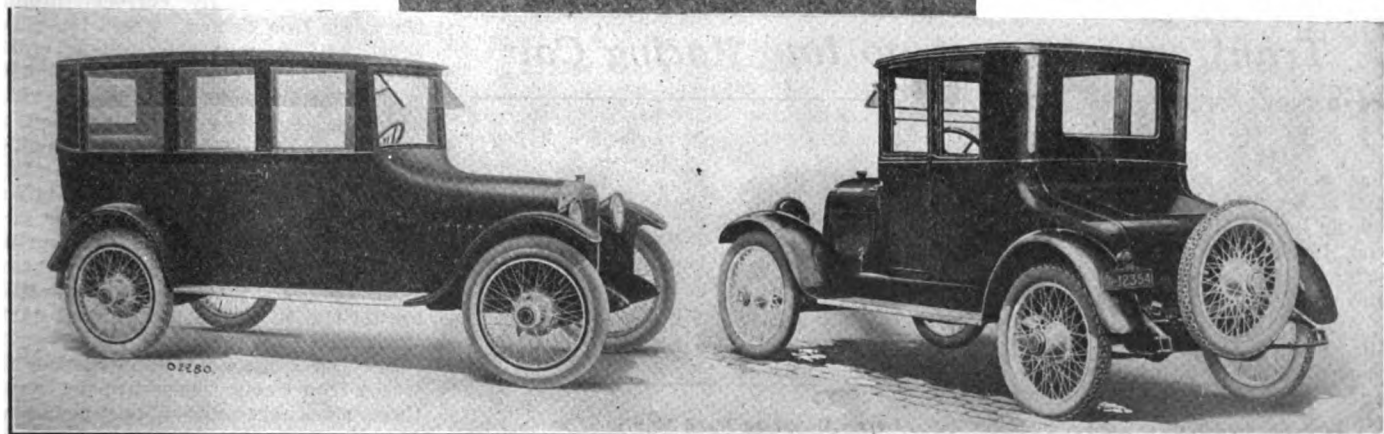
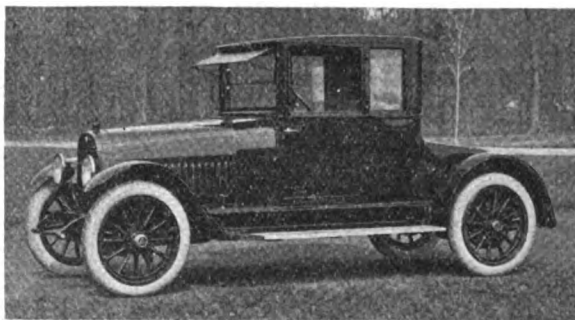
The four-passenger coupe is essentially a town car for the owner-driver, while its near relative, the coupelet, fills the requirements of those who adopt this style of conveyance for all the year round use.

Following out the tendency that has been prominent the past season in the open cars toward long, straight lines and close-to-the-road appearance, the new enclosed cars have the low effect. The body that is swung up in the air like a thoroughbrace coach has gone by, and nearly every maker is dropping the frame and underslinging the rear springs in an effort to obtain the low effect.

Another step in the same direction is the general adoption of the flat roof, just enough curve being retained to shed the rain effectively. The old rounded roof has been discarded and yet the designers have been able to retain ample head room for the comfort of the passengers. The exterior lines are straight without being angular, the most successful designers introducing just enough curve to blend the hood, cowl, fenders and body together into a pleasing unit.

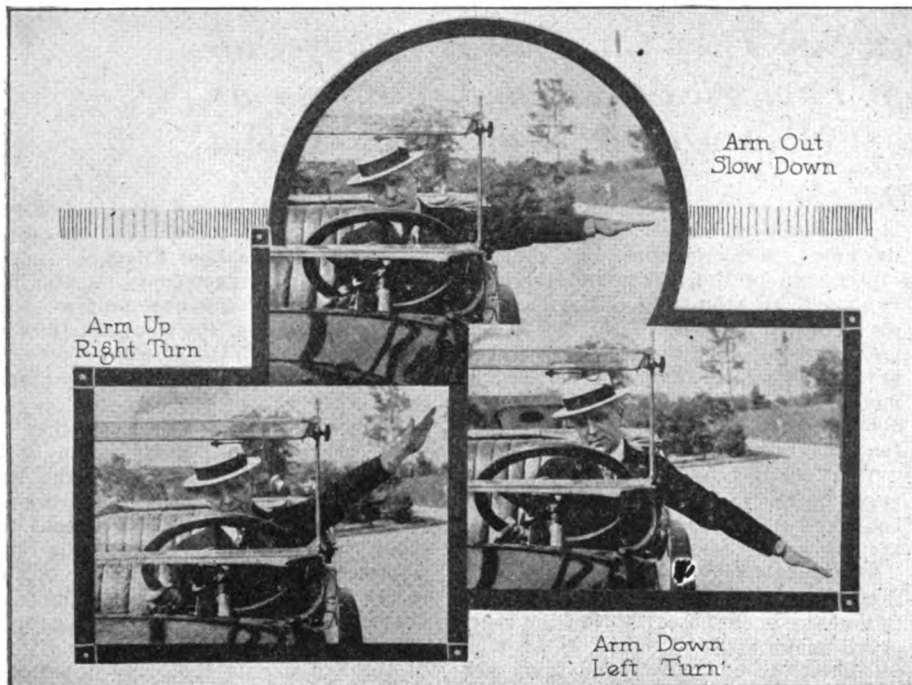
Good Ventilation.

The stuffiness that used to deter many persons from using the enclosed type of car constantly has been done away with in modern types. The windows are extremely large and easily adjusted in an open or partially open position, and ventilators have been introduced so that there is plenty of air for all the occupants. The wide windows in the sedan and also in the limousine models afford the occupants practically as complete a view as in an open car. Instead of the little window in the rear of the back compartment, there are now large windows.



At Top, Hudson, 1920 Coupe; at Left, Oakland; at Right, Maxwell 1920 Cabriolet.

Many Automobile Accidents Are Due to Confusion Over Signalling By Hand



Hand Signals Recognized by Many Motor Clubs.

THOUSANDS of the minor motor car accidents, and a great many of the serious rear end collisions can be charged up to improper hand signalling that is indefinite, lacks any informative quality and is often positively misleading.

The average automobile pilot thrusts out his hand in a horizontal position to signify almost anything, right turn, left turn, an intended stop or any other intention.

The driver in the rear is warned that the man ahead intends to make some sort of a move out of the flow of traffic, but he is not definitely enough informed to take any special measures that may be necessary to meet the exact move of his leader.

The law states that the driver of a motor car shall signal in some unmistakable manner which way he is going to turn, but there are a great number of "Huns of the highway" who utterly and willfully disregard their duty to the man behind.

Signalling is made comparatively easy by the left-hand drive, and a system of hand signals that has been adopted by many motor clubs and has proved very efficacious in eliminating rear-end collisions is as follows:

For a left turn the arm is extended downward. For a right turn the forearm and open hand is raised directly upward, and to give warning of an intention to slow down or stop the arm is thrust out straight.

These signals have been recognized by motorists as being simple, yet unmistakable, giving the driver behind instant and accurate information as to the immediate intention of the man ahead.

Another thing that the novice driver should practise and learn thoroughly is turning corners. It is difficult to turn a corner at low speed, and if high speed is used the car goes too fast. The novice at the wheel should practise going into second speed just before he reaches the corner he is to turn and then drive around at slow speed.

Transforms Ford Auto Into Racing Car

TRANSFORMING a Ford into a racing car, the new Roof 16 Overhead Valve Equipment for Ford motors has made the automobile world sit up and take notice. This equipment is made by the Laurel Motors Corporation, Anderson, Ind., and the company points with pride to laurels won by Ford car drivers through the use of its equipment.

Among these is Loren Darst, Eureka, Ill., who, it is announced, has made a record for one-mile dirt track in 50 seconds flat. His best straightaway is 92 miles.

Mr. Darst's car was equipped with the



Loren Darst in Ford Equipped with Roof 16 Overhead Valve Equipment.

new Roof 16 Overhead Valve Equipment, with lightweight grey iron pistons, aluminate connecting rods and a high-tension Dixie magneto. The car has disc wheels, with roller bearings in the front wheels. It had the Laurel underslung parts with a drop of four inches, a special 1¼-inch carburetor, three to one gears and carried a special oiling system.

The entire equipment was furnished to him by the Laurel Motors Corporation.

The Roof 16 Overhead Valve Equipment for Ford motors is for touring cars, closed cars, trucks and speedsters. It is a great aid for hill climbing for touring cars and increases the pulling power through sand and mud. The company announces that Ford racing cars with its equipment have attained speeds from 80 to 100 miles per hour. The price, complete, is \$115 f. o. b. factory. There is nothing extra to buy. The cylinder head equipment is all ready for installation, and it takes the place of the regular Ford cylinder head. The installation is simple for any mechanic.

The manufacturer states that comparison brake horsepower tests of the United States Bureau of Standards gave the standard Ford motor with regulation carburetor 18.7 horsepower; the same motor with 16 valve head and regulation carburetor 22.4 horsepower, and the same motor with 16 valve head and special carburetor 29.7 horsepower. Recent tests at the Bureau of Standards with type B of the Roof 16 Overhead Valve Equipment, the company states, gave 32 horsepower.

The Laurel Motors Corporation is manufacturer and distributor of speed and other specialties for Ford cars, three to one gears, high speed camshafts, aluminate light grey iron pistons, aluminate connecting rods, racing spark plugs, racing carburetors, roller bearings, counterbalances, wire wheels, multiple speed transmission, high-tension magnetos, special oiling system, special worm and gear, steering gear, racing tires, racing bodies, hood and radiator, and parts for underslinging chassis.

Attractive agency terms are offered and the company is prepared to send upon request complete literature on how to build fast cars and double the value of the converted Ford truck and descriptive circular on speed and other specialties for Fords.

NORWESCO IRON CEMENT.

A new "chemically correct" product, Norwesco Iron Cement, which the maker says, will permanently repair cracks, blemishes and leaks in radiators, boilers, steam, hot and cold water pipes, threaded joints, etc., has been placed on the market by the Northwestern Chemical Co., Marietta, O.

Norwesco Iron Cement is made in powder form and manufactured under strict laboratory supervision, which insures a standard quality that will give the desired results. It was used extensively by the United States government during the war.

For the consumer's convenience Norwesco Iron Cement is put up in cans of three sizes, six ounces, one pound and five pounds.

Autumn Fashions for Motoring

*Leather and Leatherette Coats Included Among
These Most Fascinating Garments*



A, Princess Coat, Made of Plain Material, with Lining, Facings and Cuffs of a Plaid Which Matches the Plain Material in Color; B, Maxwell Leather Coat; C, Close Little Hat with Close Little Trimming; D, Nymco Motor Hat; E, Stunning Plaid Set of Hat and Scarf; F, Motor Hat Made of Satin and Corded with the Same; G, New Model Coat for Motor Wear Made of Furwee Muskrat; H, D'Arcy Blouse; I, Nymco Set of Hat and Scarf.

By MRS. A. SHERMAN HITCHCOCK.

WITHOUT doubt September and October are two of the most delightful months of all the year for motoring. The heat of the summer has passed away and the temperature is one almost of idealism. Merry motor parties speed over the country highways. Week-end parties, by the aid of the omnipresent motor, are enjoyed by a large majority, and some hostesses have arranged to entertain their motoring friends over Sunday at their country homes until holiday time. Truly, the motor car has revolutionized traveling and has made country life not only possible, but thoroughly delightful, until very late in the season, something which would not have been deemed a possible thing but a few years ago. At the country club and inns and wayside restaurants come the motor devotees. They see the charming historic places, they choose the restaurant where they will meet mo-

tor friends and see the most up-to-date fashions a la motor. The smart social set drive out in their newest and best car, clad in their most fascinating coats and hats and frocks. Many motorists enjoy a few days touring at this season of the year, with the pleasant breaks in the day's journey for luncheon and dinner in unaccustomed hotels, seeing new faces and hearing new voices, and the innumerable little surprises that make a motor tour a thing of happiness and joy.

The motor woman of today is a very differently clad creature from her predecessor of a few seasons ago. When the motor coat is laid aside in the dining room we see a charmingly gowned woman, appearing as immaculate and attractive after a fast motor spin as though she had just stepped from her boudoir. The motor woman's motto is now "tout pour plaire" and she successfully carries it out.

Among the most fascinating garments seen for motoring are the new leather

and leatherette coats. There was a time when the leather garments for women were so heavy and clumsy that they did not appeal to the motoring woman, but they are now soft and pliable, decidedly comfortable and exceptionally smart. They possess an element of exclusiveness which cannot be found in other materials and marks its wearer as the motor devotee. The illustration shows one of the season's newest and best models. It is called the Maxwell model and is a 36-inch garment, with kit pocket and all around belt. It is as waterproof as any sewed seam coat could possibly be and is a garment which every motorist should possess. An especially handsome and practical garment is the new Americanette, a reversible leather and tweed coat, made upon the smartest of lines and possessing every element required in a motoring garment. Both the tweed and the leather side is beautifully finished and the side best fitting the particular occasion may be worn. There are large kit

pockets on both sides and the belt is of the military type. The leather is a handsome tan color and the tweed is black and white.

Other models in leather are shown in shiny sheepskin in brown and black and are lined in suede cloth of the same color as the coat. Coats in leather and worsted combinations are very new also. They come in heather, oxford and plaid mixtures and have pockets and belts of leather. Motor coats of buck suede are shown in tailored box effect and are in shades of blue, rose, green, brown and purple, and are lined throughout with taffeta. They are in the 36-inch length, which promises to be the very best for this style of coat.

The really new motor coats for autumn are very luxurious as far as material goes. The beautiful Worumbo Camel's Hair is one of the leaders and is light as a feather and as warm as fur. It comes in all desirable shades and makes a beautiful and very practical coat. There is practically no wear out to the Worumbo woolsens and they will stand the most severe wear and come out with flying colors. Another beautiful material which is high in fashion's favor is duvetyn. The Kordovan duvetyn is one of the most delightful weaves ever turned out by any loom. Light in weight, of a velvety texture and a peach-like bloom, it is an ideal material for coats, frocks and millinery. Gloveskin duvetyn is another exceptionally fine material and one to be highly recommended to motorists. The smart new colors shown in Kordovan and Gloveskin duvetyn are Chaudron, a warm tan; Minaret, a rich shade between a terra cotta and a deep red; Mandarin, a handsome golden brown; chestnut-brown, just what the name implies: twilight blue, a wonderfully soft shade of blue; Bleu-France, a dark French blue; Chinchilla, a rich gray, and the new rose taupe, seal brown and a full line of staple colorings. Cheruit Twill is another splendid material for the motor woman's wear, and comes in all the staple shades, as well as henna, mastic, chinchinna, peanut, lava and elk brown. Nubia Gloveskin is a very attractive mixture in all the new color combinations. These are the leading wool materials of the season and if the motor woman wishes to be assured of serviceability, durability and smart appearance, her choice should lie among them.

Another beautiful material which will be a favorite with the smartly dressed woman is the Crompton Velveteen. Of splendid wearing quality, beautiful colors and exquisite texture, it will lead in fashion's realm for coats and wraps, frocks and hats. Some of the most charming colors for motoring wear are beaver, castor, French blue, reseda, mignon, taupe, slate, hemlock, leather, thrush, Java, African, Russian green, wine and military blue. Crompton Corduroys will also be greatly worn and can be given very severe usage and still retain their freshness and beauty. Garments made of the velveteens and corduroys will be trimmed with fur as a rule and make very handsome and luxurious coats. The Crompton materials

Motor Coat of Autumn Warm and Comfortable



(Courtesy Worumbo Co., New York City.)

It requires no prophet to predict that the motor coat of autumn will be a warm and comfortable affair. The coat illustrated has extreme lightness of weight and assures a cozy warmth. Made of Worumbo Camel's Hair, it falls in straight lines, and to be quite snug, has a buttoned belt. A collar may be brought up closely around the throat to make it even more snug.

are of a high grade and may always be thoroughly depended upon. Coats for winter wear, lined with lambs wool, are equally as warm as any fur garment, and the most charming accessories may be made to accompany them. Muffs, scarfs and hats, matching the coat in color, renders the motor outfit very fetching and artistic in its effect.

Blouses and Frocks.

For motor blouses and frocks the Crompton velveteens and corduroys are ideal materials. They are dressy enough for any occasion and still not too dressy for quite conventional affairs, and their wonderful durability are their best recommendation for the motoring sport, which

really requires strongly made fabrics.

Browns in a range of shades from pelt to kangaroo are to be the reigning colors for fall and winter.

The new Paddock coat is the greatest novelty shown so far. It is inspired by the old coaching coats of bygone days. They are decidedly practical garments, having huge collars and cuffs and are wrappy in silhouette. Another new model is called the "barrel" coat. It is built with the fulness which would cause it to bulge in barrel fashion if it were not restrained by a string belt. It falls full from a tight choker collar, gathered in at the bottom, and is hip length as a rule.

Generosity of cut is apparent in all the new collars of the fall coats. They are cut very large, extending to the shoulders and standing up around the chin. They are sometimes held in place by a blind button beneath the collar, while in other models, one or two decorative buttons fasten through.

In fur coats the dolman models are to lead. They are made with loose, straight or belted front, kimono sleeves or extended cuffs, while some models have no cuffs at all. The most noticeable effect is the great width of the shoulders in all fur garments. Collars are very large, some of them assuming cape like proportions, and they are cut on most becoming lines. Many have the shawl effect when worn flat, assuming choker lines when closed. Linings have never been so distinct a feature and never before has so much attention been given to make the inner side of the coat as distinctive as the outside. Any and all furs are modish this season, the browns being strong leaders. Paris is decidedly keen for tawny pelts of all kinds and the same idea prevails, of course, in this country.

Trico Silk, that wonderfully popular material, is one of the leaders for motor frocks and is very chic. A little embroidery, or some stunning fringe, is all the trimming it requires, and many smart frocks of Trico carry no trimming except buttons. Georgette Satin, a beautiful heavy satin, is an ideal material, and has a richness of finish and texture that is a delight to the wearer. It lends itself particularly well to tailoring and includes all the new colors. Frocks of this character are the only ones really suitable for wear beneath the long, heavy coats. A combination of velveteen and trico makes a stunning and practical motor frock.

The skirt and blouse has been taken up with much enthusiasm by the motor woman. The new style of over-blouse has appealed to the smart woman and nothing could be more practical, comfortable and chic than the well made skirt and over-blouse. Wool skirts in bright stripes and plaids are very good style, while the rough silks and the new satins make up into beautiful skirts. The smartest blouses that have been brought to my attention are the d'Arcy models, which are very distinctive and exclusive and show new interpretations and innovations that render them far ahead of anything seen in former seasons in this

line. The model illustrated is made of lovely Moon-Glo Satin and is heavily embroidered in a novel and artistic design. The lines of style are smart, yet it is decidedly comfortable and practical. The motor woman possessing two or three d'Arcy blouses and one handsome skirt is well equipped for any occasion she would encounter on her fall tour. The Russian, both unbelted and with the tie, or sash, is very popular. The kimono sleeve is featured on many models and the trimmings are beads, tinsel, fringe and embroidery.

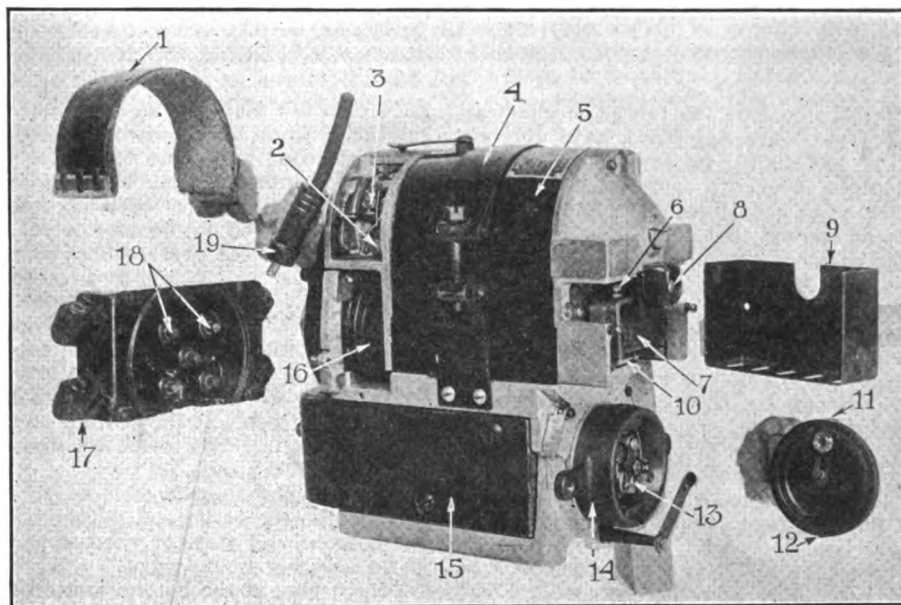
Motor hats in patent leather combined with satin and taffeta are among the new comers for fall. They are quite small with brims wide enough to shade the eyes and just the thing to shed the dust on a long motor trip. The shiny surface of the leather is a pleasing contrast with the silk in burnt orange or jade. A purple turban made of rows of narrow wool loop fringe, and draped with a long chiffon veil trimmed with a row of the fringe, which falls to the waist, is another smart model.

There are some of the smartest motor sets seen in the Weyman make which every motor woman will long to have. They are made up of exquisite fabrics and come in sets of motor pillows and hats, hand bags and hats, collarettes and scarfs with hats, etc. A burnt orange pillow in velvet is piped in black velvet and in one corner is a decoration cut out of black and white kid. With this there is a draped yoke bonnet of the orange velvet faced in black velvet and trimmed with kid. Another is a gray panne turban piped in burnt orange velvet, and there is a motor pillow of the panne also piped with the orange velvet. A handsome Weyman set is a large tam of jade angora set on a black velvet bandeau and caught at the side with a black grosgrain bow and buckle. With this there is a large muff, long and narrow, made of the black velvet, with two stripes of the jade angora running around it and suspended about the neck by a tiny black velvet ribbon. A great many of the motor hats for the season are made of kid and especially prominent is the use of the black kid in combination with a bright colored velvet, such as burnt orange or poppy.

A frameless motor hat, just launched by a well known designer, is bound to be deservedly popular. This hat is of velvet in a soft, but most becoming roll brim that can be pulled into any shape desired. A sectional motor tam is made of duvety and is embroidered in a design which almost covers it. Many duvety and velveteen motor hats are embroidered in designs done in wool and floss, but there is nothing quite so smart as the white angora. There are charming little duvety motor hats trimmed in little hand made fruits set in relief against the crowns. A fabric that looks like brocaded plush has been made up into motor hats and is most unusual and effective.

Some of the most charming hats are made entirely of ribbon and Madame Spencer, the noted designer, has evolved some ribbon models that are most artis-

EISEMANN COMBINES MAGNETO AND GENERATOR IN SINGLE UNIT



Principal Parts of the New Eisemann Magneto-Generator: 1, Dust Cover for Commutator; 2, Generator Commutator Brush; 3, Generator Third Brush; 4, Strap Holding Generator to Magneto; 5, Armored Generator Field; 6, Cut-Out Relay Adjusting Screw and Lock Nut; 7, Cut-Out Relay; 8, Generator Binding Post; 9, Ventilated Cover for Cut-Out Relay; 10, Two-Ampere Fuse in Shunt Circuit; 11, Ignition Cut-Off Cable; 12, Waterproof End Cap for Breaker Box; 13, Breaker Contact Points; 14, Timer Lever Body; 15, Magneto Magnet; 16, Distributor Rotating Disc and Segment; 17, Waterproof Distributor Block; 18, Distributor Brushes; 19, Waterproof Cable Terminals (four used).

THE Eisemann Magneto Co., Brooklyn, N. Y., has combined a magneto and a generator in a single unit that is interchangeable with any engine equipment that conforms to S. A. E. specifications. For instance, the magneto may be removed from any engine and replaced by the Eisemann unit, which will supply ignition current and will generate sufficient energy to light any average system of lamps. The generator will generate current for any starting motor aside from the heaviest engines. No changes whatever are necessary for the installation of this instrument, which is suited for use on cars and trucks of all kinds. The magneto and generator are independent. The magneto has its own permanent magnet field and the gener-

ator has an electro-magnetic field. The generator unit is installed on top of the magneto and is driven from the main shaft of the magneto through a train of three gears. The teeth of the gears are helically cut and as they run in grease they are practically noiseless. The generator unit may be removed entirely without interrupting the utility of the magneto unit. This is a decidedly valuable quality from the fact that should the generator need attention mechanically the car or truck can be used with the magneto only. The removal or replacement of the generator can be done with the simplest tools and in brief time, and can preferably be done on the engine without disturbing the magneto or its drive. The magneto unit is a standard Eisemann instrument, slightly modified in shape. The generator unit is built for six volts as standard. The generator is designed for a single wire system and there is but one generator binding post.

ator has an electro-magnetic field. The generator unit is installed on top of the magneto and is driven from the main shaft of the magneto through a train of three gears. The teeth of the gears are helically cut and as they run in grease they are practically noiseless. The generator unit may be removed entirely without interrupting the utility of the magneto unit. This is a decidedly valuable quality from the fact that should the generator need attention mechanically the car or truck can be used with the magneto only. The removal or replacement of the generator can be done with the simplest tools and in brief time, and can preferably be done on the engine without disturbing the magneto or its drive. The magneto unit is a standard Eisemann instrument, slightly modified in shape. The generator unit is built for six volts as standard. The generator is designed for a single wire system and there is but one generator binding post.

OVERHEATING PREVENTIVE.

In cars using thermo-syphon cooling, the water system should be kept filled. If water level drops considerably the circulation of the water will be reduced and may be stopped. With a pump system the pump continues to force the water through the system, regardless of how much or how little of the liquid there may be, but the circulation of the syphonic system is simply a natural flow and this is interrupted in case a considerable portion of the outlet pipe is empty, which would result in the overheating of the engine.

OVERHAULING THE REO

THE Reo cars, so far as mechanical parts are concerned, have differed but slightly for several years. The changes made are more in refinement, such as in body lines and improvements in the engines that make them more economical in consumption of gasoline and oil. The latest Reo the Fifth has several changes in the engine that make it smoother running, so it more nearly approaches the qualities of a six-cylinder type. The crankshaft is counterbalanced, the pistons are Lynite construction and extremely light weight, and the rear springs are hung below the axles, so the car is very easy riding.

If one is to make a complete overhaul it will be good judgment to have tools suited to the work. The public garage usually has sufficient tool equipment, but the private owner often lacks what is essential. The following list will suggest to the owner tools that he may need in addition to what he may have available.

Those that will be very useful include a hand blow torch, for heating and soldering; a wire brush, for removing dirt and stiff grease; a hand vise and shears for cutting sheet metal and heavy packing; a good bench vise, with five or six-inch jaws; a hacksaw for cutting metal bolts, etc.; soldering iron, for soldering leaks in radiator, etc.; medium weight machinist's hammer; set of three punches, solid punch, cold chisel and prick punch; cutting pliers, large and small screw drivers with wood handles; set of socket wrenches, or two sizes of adjustable end wrenches; stilson wrench, monkey wrench and gas pliers; set of double end "S" wrenches; set of three carbon scrapers and a set of files, including square, half round, triangular and rat tail, and coarse, medium and fine.

If the car has been in use for a year or less it will need but a partial overhaul. But if used a longer time it will be wise to give it a thorough overhaul. The purpose of this article is to advise the owner how the work can be done, the probable conditions to be met and practical means for restoration and adjustment.

Cooling System.

The cooling system of Reo cars is a positive circulation of water by a gear driven centrifugal pump. The radiator used is a flat, vertical tube type, with a casing that is easily removed for repair. The air circulation is by a belt driven fan.

To clean the radiator thoroughly, drain the cooling system and fill it with a solution of one pound of washing soda dissolved in hot water. Pour the solution into the radiator while hot. Run the en-

gine for a few moments so as to get circulation. Drain the system and fill it again with cold water, run the engine for a few moments and again drain it. Do this two or three times until the washing soda is flushed out of the system. If the engine has been overheating you will find that this will restore it to normal functioning.

To remove the radiator from the frame, disconnect the hose from the engine. Loosen the brace rod at the top that extends from the radiator to the dash and take out the bolts at the bottom of the radiator that fasten it to the cross member of the frame.

Set the radiator on two blocks on the floor. Close the outlet and the inlet, top and bottom, with plugs of wood or pieces of tin soldered to the edges. Close the drain out plug at the bottom and fill the

to finish it. For small leaks that are inaccessible the best method is to use a prepared compound after the radiator has been replaced and connected to the cooling system. This is known by the trade name of "Sem-en-tal." Take about half a can of the compound, fill the radiator about one-third full of water, add the Sem-en-tal, fill the radiator with water and run the car for a day. Then draw off the solution and fill the system with clean water. The Sem-en-tal will seal all the small leaks permanently, and will be seen on the outside, resembling particles of red lead, which may be rubbed off smooth with a piece of cloth.

Examine the hose connections. If they have become soft or are in poor condition they should be replaced. In putting on new hose connections, coat them inside

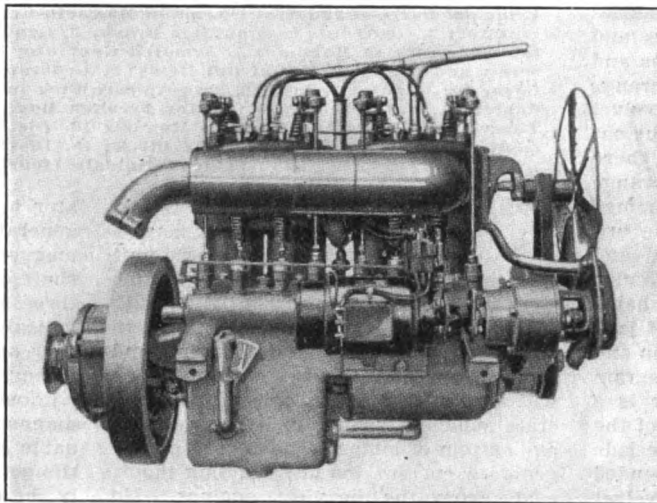
with shellac to make them water tight. Examine the water pump next. If the water circulation has been good not much work is necessary, except to repack the water pump stuffing box. The pump is on the forward end of the camshaft, directly back of the radiator. The stuffing box is on the pump shaft and is packed with wicking, which must be renewed at times. To repack it, turn the stuffing box nut back on its thread until it is loose on the shaft. The old wicking may be taken out with a fine steel pick, the end of a file, or a knife. New wicking can be bought at any hardware store. To treat it for use, take a length two or three times as long as needed. Double it two or three times to make it thicker and

dip it in a solution of oil and graphite. Wipe off the oil and wind the wicking loosely around the pump shaft inside the bushing, so that the rotation of the shaft will not unroll it. Tighten the stuffing box nut and jam it over the packing. Set the nut tight and watch it for leakage the first few times the car is used.

Engine.

The engine used in the Reo cars is entirely of Reo make and has been practically unchanged for several years. If an engine has been used for two years or more without overhauling it will be well to entirely disassemble it. But if a partial overhaul is decided on it probably will not be necessary to take the engine from the frame.

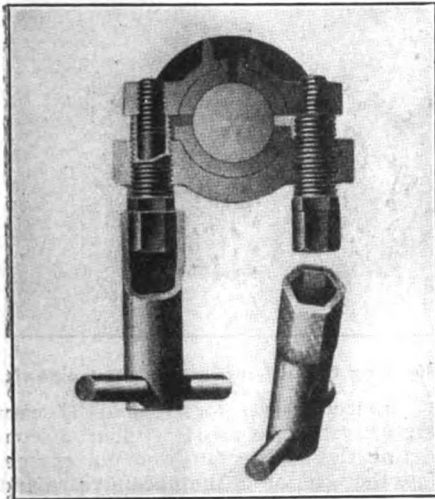
Both the main and the connecting rod bearings can be taken up, the valves ground and carbon cleaned without removing the engine. To take out the engine it is necessary to remove the exhaust and inlet manifolds. These are bolted to the sides of the cylinders near the top and are held in place by studs. Loosen the nuts on the studs and first



Power Plant of Reo Fifth Passenger Car and 1500-lb. Truck.

radiator with water, under pressure if it is available.

If one wishes to put the radiator under pressure, a plug of wood can be screwed into the filler having a hole bored in it that will take the connection on the end of the hose. This connection will make its own thread if the wood is soft. The plug used in the filler should be soft wood, so it will readily screw into radiator. Pressure may be applied to the radiator. If leaks are shown, mark them with a scraper so they may be found after the water has been drawn off. In using water pressure to find leaks care should be taken else too much pressure may damage the radiator. Drain out the water and if leaks are found they should be soldered. Soldering may be done if the leaks are accessible with the blow torch, using the torch to heat the iron and later to heat slightly the parts that are to be soldered. Care must be taken while soldering not to loosen other tubes. Use just enough solder to do the work. If a lump does not smooth under the iron a scraper or a file may be used



Sectional View of Main Bearing Showing Method of Adjusting.

remove the exhaust manifold. The inlet manifold on the opposite side is removed in the same manner. The gasoline feed line should be removed, including the vacuum tank, disconnecting the feed line at the carburetor. Take the carburetor and intake manifold off as one piece and lay them where they will not be disturbed. Care should be taken to see that the adjustments of the carburetor are not moved. If the vacuum tank should be fastened inside of the dash instead of outside, it will not be necessary to remove it. Simply disconnecting the feed from the tank to the carburetor will be sufficient. The water pipe connections should next be disconnected from the top and the side of the engine. These are held by studs. All wiring of the engine should be disconnected and where possible identify the wires as disconnected with small tags, so they can be replaced when assembling.

In the 1916 Reo cars the high-tension wires from the distributor on the end of the generator are led in a group through a tube on the side of engine between the second and third cylinders to the plugs. After tagging the wires they can be drawn through this tube and the distributor cover taken off and the wires and distributor tied against the dash. In this model there are two separate wires that connect with the generator alone. One of these, the outside wire, connects with the generator switch; the inner wire, next to the engine, is a cable from the generator to the lighting and ignition switch and ammeter.

In the 1918 and 1919 cars the wiring is somewhat similar, but there are a few changes worth noting. In these the high-tension coil is in the dash, and a wire is led from it through the dash to the tube that carries the high-tension plug wires, passing through this to the distributor. This wire can be slipped from the distributor and laid back against the dash. The wires from the plugs can be drawn through the tube and laid on the generator.

Disconnect the wires at the side of the generator, tagging them and laying them against the frame. The generator is driven from the pump shaft by a uni-

versal joint, and this joint must be disconnected before the generator can be removed. Disconnecting the end nearest the generator will be best, and by removing four machine screws the generator may be removed from the side of the engine. If the generator is defective it should be sent to an electrical specialist or to the factory where it was made for repairs. The engine is now clear of all auxiliaries and can be taken from the frame. The removal of the engine is not advised unless there is a break in the motor base or a new base is to be put on.

The fan can be taken off and adjusted. The bearings are ball and cone with races for the balls to fit in on each end of the fan hub. End play of the fan can be adjusted by loosening the outer nut on the fan end, taking it off and adjusting the inner nut to tighten or loosen the setting, locking the adjustment again with the outer nut.

Removing Valves.

Remove the spark plugs on top of the cylinders, clean them and lay them aside. In removing the valves tag them as they are taken from the engine and place them in a box.

In removing the inlet valves, first put a wrench on the rocker arm just back of the valve and bear forward and the push rod will be loosened and can be taken out. Repeat this operation with the other inlet valve push rods.

The inlet valves on the 16, 17 and early 18 models are in cages that hold them in place in the tops of the cylinder. This construction makes for easy removal of the valves by first removing the locking rings that hold the cages in place with the drift wrench found in the tool kit; second by taking out the bronze packing rings underneath the locking rings, and third, by removing the cages. A light, quick blow with a hammer on the stems of the valves will usually start the cages.

The valves can then be ground in a vise. After removing the springs and taking out the keys, hold the stems of the valves in the vise with the valves in the cages. Apply an abrasive material (not emery) such as a grinding compound that may be bought at a supply store to the faces of the valves and seats. Then with a rotary motion of the hand and cage grind each valve. Repeat this operation till a ring is formed on the valve and seat 1/32 inch wide. Occasionally one will find a valve that has been ground so often that it does not seat and the certain restoration is to true the valve in a lathe, or, better still, use a small valve truing outfit that can be bought. These tools are held in a vise and turned by a handle, a cutter seating against the valve. A valve seat can be trued very quickly. A set of re-seating tools or cutters is almost indispensable. With such a set one can re-seat any valve that has become worn or ground so far that a perfect seat cannot be otherwise obtained.

The exhaust valves are located on the side of the engine and are reached by removing the plugs over them. Unscrew these plugs with the drift wrench and take them out. In removing the springs some form of valve lifter is very useful, but one may get very good results

with a long screw driver using a block as a fulcrum. Lift the springs one at a time and remove the keys. Some valves will stick and a valve lifter will be handy.

After the valves have been taken out they are to be ground in the cylinders. Apply the abrasive material to the faces of the valves and insert them in the openings with light springs underneath to release the valves when grinding. With a screw driver or a bit brace the valve may be ground in the cylinder, giving it a greater turn and a reverse motion, so as to grind the valve and seat even. It would be wise to put a piece of waste in the opening in to the cylinder to prevent the grinding material getting into it. Grind all the valves, getting rings on the finished valve seats 1/32 inch wide. If you want to be positive of perfect work, smear a little Prussian blue on the valves and turn them in the seats. The high spots will be shown.

While the engine is open remove the carbon, which may be done either by the oxy-acetylene method of burning or by the use of scrapers worked through the openings on the top of the engine block. When scraping carbon be sure that the piston is at the top of its stroke in the cylinder on which you are working.

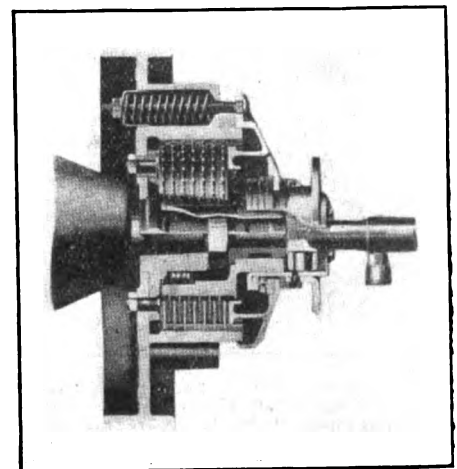
Later Models.

In later models of Reo four-cylinder cars the inlet valves are not removable through the head. These valves, on account of the construction, are better cooled because of the water jacket surrounding them.

It is not necessary to grind the valves save at long intervals, as they have very large surfaces and the cooling water keeps the temperature down.

After the carbon has been removed replace the valves, springs and keys. In putting in the plugs over the exhaust valves care should be taken to have them gas tight. A little white lead smeared on the threads will insure this. Be sure the waste has been taken out of the tops of the cylinders before putting the plugs in. When putting in the inlet valves tighten them on the bronze gaskets to be certain they are gas tight.

To tighten the main bearings, drop the mud pan under the engine and they can be got at very easily. Remove the guard wire from the heads of the locking bolts and with the socket wrench from



Cross Sectional View of Clutch.

the tool kit unlock the bolts by turning to the left. Then slip the wrench down over the threaded spacing sleeve and adjust the bearing caps as may be necessary.

If the engine has been run only a short time and the main bearings require only slight adjustment, carefully turn the spacing sleeves to the left about one-half turn. Then lower the socket wrench to the locking bolts and turn them to the right and lock as tight as possible. Verify the adjustment by turning the crankshaft.

Do not adjust so close that the shaft turns hard. If you find that you have done so, unlock the locking bolts and turn spacing sleeve slightly to the right. Then lock the bearing and again try the crankshaft. Care should be taken to adjust the spacing sleeve the same on each side of any bearing or the bearing will be thrown out of line. To make this certain mark each sleeve with a piece of chalk before turning it, so that the distance of movement can be seen when final adjustment is made. Care should also be taken to replace the locking wires securely.

The connecting rod bearings are adjusted through the hand hole covers on the side of the crankcase. To determine play in the rods turn the engine so that the cranks are vertical and vigorously try to move them along the crankshaft. If there is play turn the crank so that the locking clamps can be released with a screw driver and the locking bolts loosened with a wrench. Remove a shim from each side of the bearing and lock the bolt as tight as possible. Do not adjust so close that the shaft turns hard, as slight play is necessary for expansion. For final adjustment liners or shims not thicker than .002 or .003 of an inch should be used. These shims should be removed one at a time until there is no play and then one thin shim should be added to each side to give the desired play. Each time a shim is removed the bolt should be tightened and should not be relieved to give the desired adjustment. That is, the adjustment should be regulated by the number of shims and not by decreasing the tension on the

bolt. Be sure that the connecting rod bolts are locked securely by the clamps before closing the hand hole plates.

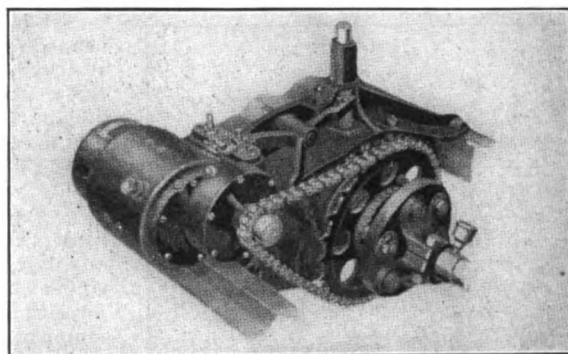
The center main bearing can also be taken up while the hand hole plates are off. The bearing cap screw lock nuts can be removed and the cap lifted from the shaft. Remove one lamination from each of the metal shims and replace the cap. Tighten the lock nuts, and if the shaft turns easily repeat operation until a slight tightness is realized. Be certain the lock nuts are thoroughly tightened when the adjustment is completed.

One bearing should be tightened at a time, and then slightly loosened to allow for the tightening of the next, and so on till the last bearing is tightened. Then all should be set up in the adjustment.

Assembling Engine.

After the bearings are adjusted the engine should be assembled. Put the generator in place on the side of engine, securing it with the four bolts. Connect the wires from the side of the frame to the generator, identifying them by the tags for their connections. Then run the high-tension wires to the plugs from the distributor and connect them. Connect the exhaust manifold to the stud bolts on the side of the engine if it has been disconnected, using new packing if necessary made from Mobelene or a material that will stand the heat. A copper asbestos gasket is probably the best for this purpose if it can be obtained, as it will not blow out as readily as any other packing. Connect the intake manifold on the other side of engine in the same manner, using new packing if the old is worn. Be sure the seats of the manifold and the side against which these are fitted are clean. Better scrape them with a knife to remove the old packing. Shellac can be used to make this packing air tight, coating one or both sides of the gasket. Use just enough to do the work and no more. If too much shellac is applied it will squeeze out when the gasket is tightened and may get into the manifold pipe and the cylinders, forming carbon. Connect the gasoline feed pipe to the carburetor, being sure that it is tight and that the gasoline does not leak.

The carburetor rarely needs attention other than to clean out the bowl. The carburetors of Reo cars are almost exclusively the Johnson model D for the earlier and the model A for the later machines. The float chamber of the model



Starting Motor Showing Chain Connection to Drive Shaft.

D carburetor used for '16 and '17 cars can be easily removed without disconnecting the carburetor from the engine. Note the position of the needle valve and turn it lightly to its seat to determine what fraction of a turn it is open, so it may be replaced in the same position.

Next remove the needle valve with packing nut and lock nut, after which the float chamber may be taken off for cleaning.

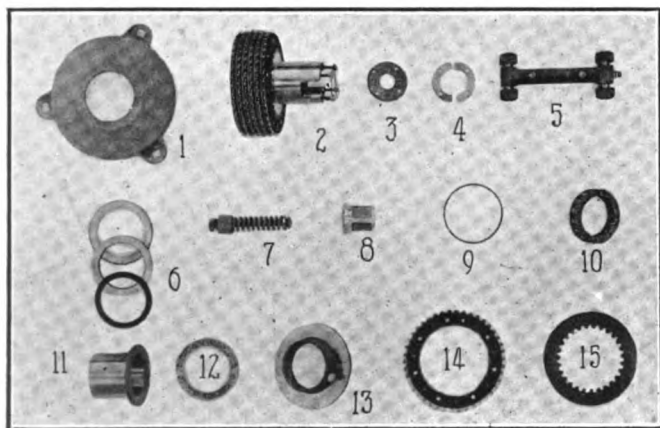
Flooding is usually caused by a particle of dirt or lint from the gasoline lodging on the seat of the gasoline shut off valve. By removing pin, the float can be removed and the gasoline valve will fall down. Care should be taken when removing the float not to lose the valve. Clean the seat of the needle with a soft cloth. Turn on the gasoline from the tank and allow a small quantity to flow through the carburetor, washing out any dirt. Then replace the shut-off needle float and pin. The nozzle may be removed for inspection by passing a wire or large nail through the cross holes to serve as a wrench handle. To clean the nozzle, wipe out the central hole with a soft cloth placed over a match, as it is of vital importance that this part of the carburetor is clean and free from any obstruction or dirt. Before replacing it hold the small end to the light to see that the orifice and channel are clean. The nozzle is carefully calibrated to flow the correct amount of fuel and must not be damaged or altered.

In adjusting the needle valve after cleaning, it is well to open the feed a little more than is required for the correct adjustment at the start, to give the engine a chance to start. After the engine has been run and the bearings have been limbered the needle valve can be cut down to the correct position.

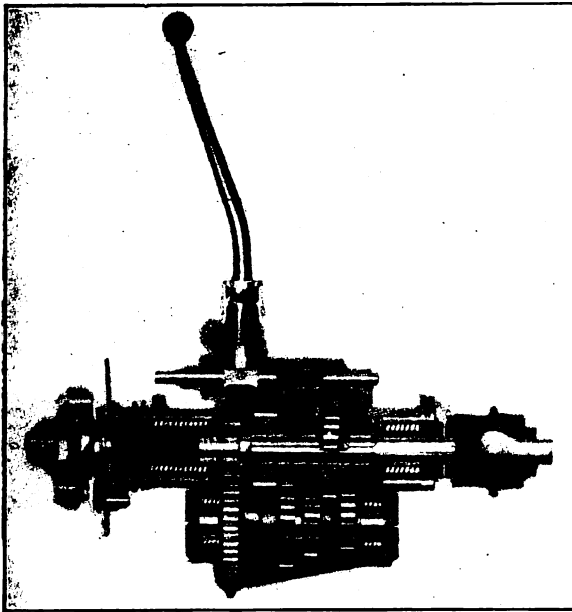
Examine the engine carefully to see that all parts are replaced and tightened. It is well to put a small amount of oil on each working part as it is assembled to be sure that it will receive full lubrication when the engine is started.

Draw off the old oil and rinse out the engine base with kerosene. This may be done by removing the plug at the bottom under the oil reservoir.

Refill the oil reservoir till the gauge on the side indicates it is full. Then add one quart more for the tightened bearings. New or adjusted bearings should receive plenty of oil for the first few miles till they have found their true bearing surfaces. After that the oil can be carried at its proper level.



Clutch Components: 1, Thrust Member; 2, Clutch Driven Gear and Universal Fork with Clutch Plates; 3, Dust Washer; 4, Universal Cover; 5, Drive Shaft for Clutch Transmission Universal; 6, Thrust Washers; 7, Clutch Spring and Bolt; 8, Driven Gear Bushing; 9, Disc Wire; 10, Driven Gear Bearing; 11, Relief Sleeve; 12, Thrust Bearing; 13, Relief Collar Retainer; 14, Faced Driving Disc; 15, Driven Disc.



Cross Sectional View of Transmission Showing Location and Adjustment of Bearings.

The Reo clutch is a multiple disc type, the discs consisting of steel plates, each alternating one being faced on both sides with asbestos fabric, riveted in place. These discs require no oil or attention except good judgment in slipping the clutch.

Slipping Clutch.

A slipping clutch is caused by lack of clearance between the clutch opening fingers and the plate on which they strike. This clearance should never be less than 1/16 inch nor more than 1/4 inch when the clutch is in the driving position.

The cause of gear clashing is usually in the clutch throw out collar arms, due to wear. Beneath the front floor boards is a single cross shaft, over the clutch collar at the center. The clutch pedal is at the left end of this shaft, while at each side of the clutch is an arm adjustable for wear. These arms fit into the throw-out collar on the clutch. To adjust them, loosen the set screws on the top and swing them slightly back toward the face of the collar, seeing that they bear against the plate equally.

A clearance adjustment for these fingers is at the foot of the clutch pedal, where there is an adjusting screw and a set screw to hold the adjusting screw. The fingers can be adjusted either in or out by these screws.

The clutch closing springs are seated in recesses in the flywheel. Their pressure should be such as will prevent the clutch slipping, but never so great as to make the foot pedal difficult to operate. More or less pressure can be obtained by screwing the nuts either in or out. The best place to reach these adjusting nuts is on the front of the flywheel, next to the motor.

The clutch should be adjusted immediately if it slips, for continued slipping will ruin it.

The ball thrust bearing in the hub of the clutch should be oiled every 1000 miles through the small hole in the clutch housing.

Unless badly worn there will not be

much to be done with the clutch outside of the parts mentioned.

In overhauling the transmission gearset the principal conditions to look for are wear in the gear teeth and bearings. Worn gear teeth will be seen at a glance after taking off the gear case cover. If burred on the edges the burr can be removed with a file. This can be done in the case if the oil has been drained and the case thoroughly cleaned with either gasoline or kerosene, so that the metal chips will not remain in the lubricant. Or the shafts may be taken out and the work done at the bench.

To test the bearings without removing the gears from the case the shafts can be moved side ways for side play and back and forth for end play with hand. Slight adjustments for end play

can be made with the adjusting collars on each end of the shafts. The upper front bearing sleeve is held by a shoulder screw on top of the case near the end. The upper rear bearing sleeve is adjustable end wise to take up lost motion. A series of six holes equally spaced around its circumference and 1/32 inch apart end wise provides for this adjustment. The shoulder screw should be removed and the bearing sleeve driven forward until the end wise motion is taken out of the main shaft. Then turn the sleeve around until a hole is found to register with that for the shoulder screw, when it can be screwed in, locking the sleeve securely.

The lower bearings are mounted in threaded caps and may be adjusted end wise by unclamping and turning in or out. The gear shifting rods may be adjusted by turning the shifting arms, first removing the gear shifting lever, which is held by two springs bearing on the cap and the upper half of the spherical bearing.

The gear shift forks should be examined and if worn badly new parts should be put in. If the shaft must be taken out of the case, this can be done by forcing off the rear universal joint. This joint is keyed on and will require considerable force to get it off. Remove the tightening or shoulder screw on top of the case and the rear bearing sleeve, together with the dust washer and retainer. The bearing can be withdrawn with the thrust bearing and the thrust washers on each side of it. With the transmission cover off, after removing the shift forks, the shaft can now be withdrawn, leaving the gears to slide off into the case and be taken out through the top of case.

The lower shaft can be removed by loosening the threaded caps on the end of shaft, unclamping them and turning them out, and taking out the bearings. The shaft can then be taken out and worked upon at the bench. The gears on this shaft are keyed on with Woodruff keys and will have to be taken off

the shaft with a gear puller. New gears can be put on in place of the worn gears or the gear teeth can be ground off with an emery stone.

Starting Motor.

The starting motor should receive some attention in the overhaul. If the bearings have been oiled properly every 1000 miles not much work will be necessary. The drive chain should be disconnected and examined for worn links. The chain may be put into a pail containing gasoline to dissolve the oil or grease. If worn links are found, replace them with new. Examine the sprockets and if they are worn badly replace them. The commutator can be examined by removing the spring cover at the rear end. For removing dirt or gum use a strip of fine sandpaper and a stick to hold it in place on the commutator. This had best be used when the engine is running or when the armature shaft is in a lathe.

If the commutator is uneven and the brushes do not seat even, the armature had best be taken out and the commutator turned in a lathe, taking off just enough metal to square the segments. After the commutator has been turned it should be placed in a vise and the mica between the copper segments cut down with a hacksaw blade, care being taken to cut the mica square. The mica should be cut but slightly—1/64 inch will be sufficient. Care should be taken in assembling the motor to have the bearings adjusted so the armature will turn freely and without appreciable friction. In adjusting the brushes be sure that they are in the same holders and if badly worn new brushes should be put in.

The work stated will apply to the generator. If there is a broken wire or a short circuit in the armature send it to the factory, where a perfect repair will be made.

Universal Joints.

There are three universal joints, one in front and one in the rear of the transmission gearset case and one ahead of the rear axle. This applies to the '16 and '17 models.

Some wear will be found in these joints. They can be tested by rocking the shaft by hand. If considerably worn it will be wise to put in new parts.

The torsion rod should be looked over carefully. It is secured to the rear axle at one side of the differential case by a long bolt and the front end is mounted on a bracket bolted to a cross member of the frame just back of the transmission case, being generally suspended by a guide and spring, but in some cars by a bolt. Look these bolts over for wear. If a new bolt is loose the hole can be reamed and a larger bolt put in.

Examine the keys in the propeller shaft to see if they are loose. If necessary new keys can be fitted at small expense. A loose key will probably be noted when examining the universal joints.

The rear axle of the '16 and '17 Reo cars in the four-cylinder models are a semi-floating type, and the axle and housing must be removed from the car for overhaul. After the brake rods, springs, torsion rod, propeller shaft, etc., have been disconnected the axle may be drawn from under the frame, which must either

be jacked or slung on a stick of timber under it, with a rope knotted to the ends of the stick, and proceed over the body. Hook a block fall to this sling and to a beam over head and the frame can be lifted clear of the rear axle, which can be drawn out.

Place the rear axle on horses, boxes or blocking and support the shaft on a third box or horse. Take off the wheel hub caps, pull out the cotter pins that keep the castellated nuts from turning on the shafts, turn off the nuts and reverse them. Screw the nuts on again reversed and with a machinist's hammer strike them lightly on the ends. This will usually loosen the hubs of the wheels on the keys so they may be drawn off. If this does not loosen the wheel hubs on the keys a wheel puller must be used. Remove the nuts that hold the cover of the differential housing and take off and clean the cover.

Drain the oil from the differential housing at the drain plug, flush it with kerosene or gasoline and remove all sediment. Loosen the nuts on the side of the case so that the two halves may later be separated. On the wheel end of the axle is an outer retainer, a felt washer, an inner retainer and a Hyatt roller bearing. To remove these it may be necessary to take out the key in the axle.

At one side of the housing near the end is a small hexagon set screw with a lock nut. Loosen the lock nut and remove the hexagon set screw, which holds the end bearing rigid in the axle housing. Remove the end bearing and examine the rollers and the sleeve for wear. If badly worn it should be replaced. Do the same work on the other wheel and bearing. Draw the halves of the axle housing apart and clean them.

The Timken roller bearings each side of differential gearset can be slipped off the shafts. To remove the shafts from the differential cut the lock wires and take out the bolts in the differential case. In the center of the gearset are two pins,

each securing the hub of a differential gear to a drive shaft. Drive out these pins and the gears can be removed from the shafts. Examine the gears for wear and replace those gears that are worn too badly.

In reassembling the axle the utmost care should be taken to have the parts in correct relation and all nuts and bolts tight. At each side of the differential gear case is a bearing adjustment by which the master gear and pinion are set. Do not set the gears too close. They should mesh about the thickness of an ordinary visiting card. If the gears are out of correct mesh 1/100 inch they will be noticeably noisy. On the pinion shaft are two adjustments. One is for setting the pinion closer in mesh with the large bevel ring and the other for setting the bearing next to the universal joint. These adjustments should be made very carefully and it will be wise to consult a Reo repair man to be sure they are correct.

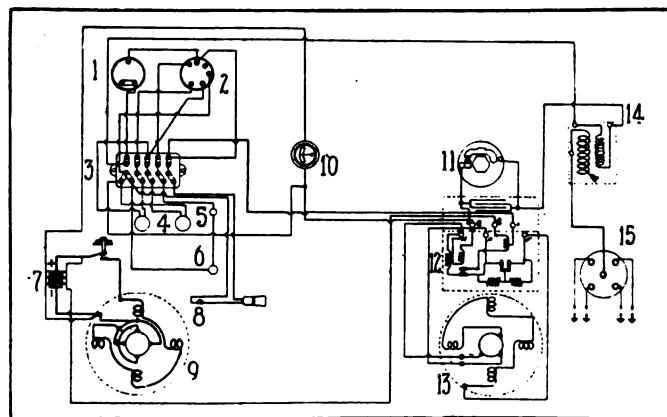
Brakes.

The brakes may be examined at this time and if found to be worn badly should be relined and adjusted.

After the rear axle has been reassembled and the wheels put on, place it under the frame and attach all spring clips, brake rods, universal joints, etc. Fill the differential housing with steam cylinder oil to the height of the filling hole on the side of the case. This is the correct level and more oil than this would work out on to the brake bands, causing slipping and inefficient brakes.

Some attention should be given to the steering gear and front axle. Adjustment must be made and all grease cups filled with grease and turned down. Play in linkage rods should be taken out wherever possible, even if the holes need to be reamed and bushings or larger size bolts put in.

The storage battery usually is given the care necessary to maintain it in good condition. If a car has not been used and little attention given to the battery, take it out of the car, clean the terminals and wires and test the electrolyte with a hydrometer, or else have



Wiring Diagram of the Remy Starting, Lighting and Ignition System Used on the Reo. 1, Ignition Switch; 2, Lighting Switch; 3, Fuse Block; 4, Head Lights; 5, Dash Light; 6, Tail Light; 7, Storage Battery; 8, Horn Button; 9, Starting Motor; 10, Ammeter; 11, Timer; 12, Relay Regulator and Condenser; 13, Generator; 14, Coil; 15, Distributor.

it tested by a battery expert. Have it put in good condition by recharging or repairing and recharging.

Examine the wiring of the car to see that oil has not ruined the insulation, or that wires are not broken, or short circuited. Replace them with new if necessary.

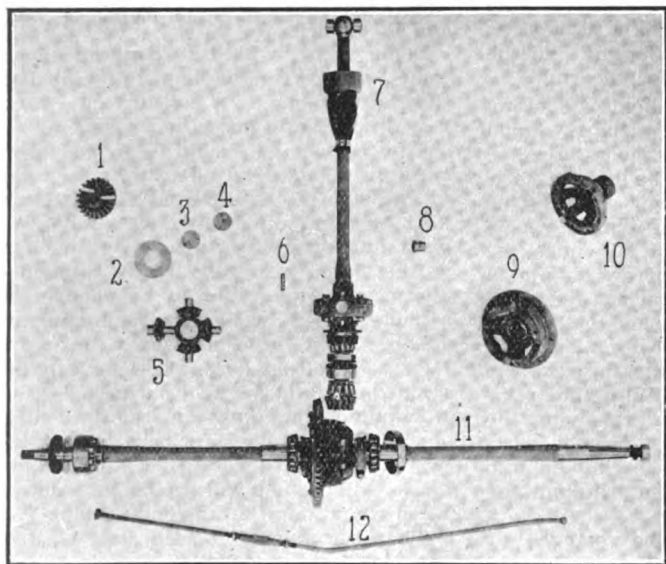
PRACTICAL PARAGRAPHS.

Rattling Tire Chains.

The common method of locking spare tires is to use a chain and padlock. The only trouble with the idea is the noise incident to the rattling of the chain and the fact that it mars the finish of parts with which it comes in contact. Some car owners cover this chain with a bit of hose, but this is usually too stiff and is somewhat noisy and even permits marring of the finish. A bit of leather or heavy substitute, the length of the chain and wide enough to form a tube to enclose the chain, offers a satisfactory solution of the problem. Turn in the edges of the leather case and if you cannot do the job yourself, the nearest harness maker will make the tube for you.

Power Losses.

Leaks mean power wasted, lost. The leak may be of water, fuel or oil, but no matter what it is it wastes power. Slight leaks here and there may cause a total loss of power that will be serious. There are dozens of joints in the engine, and each one may spring a leak under certain conditions. Good gasketing is the best insurance against leaks, but it is not all the battle. The joints must be inspected frequently. If you are not sure of the existence of a leak, squirt a little oil over the suspected spot; bubbles will tell the tale of a leak. Cylinder head holding down nuts should be tightened occasionally. The inlet manifold, if it is outside the casting, should be tightened to the carburetor and cylinder block. Remove the pan under the engine and see if there is any dripping. Go over the three major systems, water, gas and oil, and stop any leak found. For oil paper gasketing is best. Use wrapping paper and be sure there is no break in the gasket at any point around the stud holes.



Rear Axle and Drive Shaft Parts: 1, Differential Gear; 2, Differential Thrust Washer; 3, 4, Axle Thrust Plates; 5, Differential Pinions and Spider; 6, Differential Gear Pin; 7, Driving or Propeller Shaft with Universals and Pinion Drive Gear Complete; 8, Universal Joint Bushing; 9, Differential Housing (Male); 10, Differential Housing (Female); 11, Rear Axle and Differential Assembly; 12, Truss Rod.

DEFINES AUTOS IN CONNECTION WITH BANKERS' ACCEPTANCES.

In connection with the application of National Automobile Chamber of Commerce to have automobiles defined as "readily marketable staples" by the Federal Reserve Board, Gov. W. P. G. Harding of the Federal Reserve Board has given an opinion which, while it does not place automobiles in that preferred class, gives them a higher rating in connection with bankers' acceptances. He writes as follows:

"You are aware that the Federal Reserve Board has recently defined 'readily marketable staples' as used in that part of section 13 of the Federal Reserve Act which authorizes any member bank to accept drafts which are secured at the time of acceptance by a warehouse receipt or such other document conveying or securing title covering 'readily marketable staples.' This definition was published on page 652 (P. 277) of the Federal Reserve Bulletin of July 1, 1919, and is as follows:

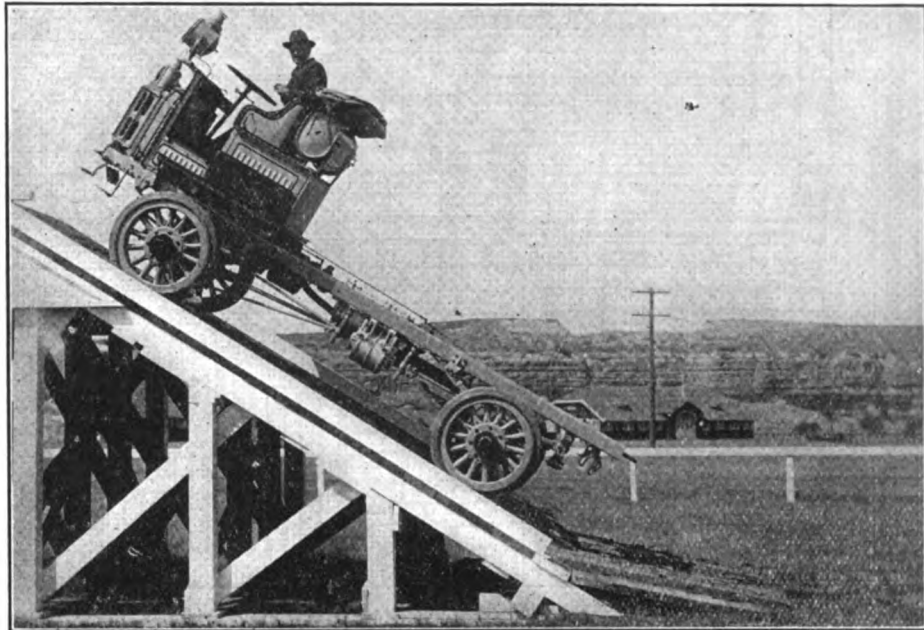
"A readily marketable staple may be defined as an article of commerce, agriculture or industry of such uses as to make it the subject of constant dealings in ready markets, with such frequent quotations of prices as to make (a) the price easily and definitely ascertainable, and (b) the staple itself easy to realize upon by sale at any time."

"The board is of the opinion that the term 'readily marketable staples' as used in the part of section 13 referred to and as so defined does not include automobiles. If, however, the seller of goods (not necessarily limited to readily marketable staples) ships goods to a buyer who arranges a banker's acceptance credit, a draft drawn by the seller on the buyer's bank and accepted by that bank comes within the terms of section 13 provided that the shipping documents covering those goods were attached at the time of acceptance. For the purposes of this part of section 13 there is no doubt that automobiles are 'goods' and that an acceptance of this character, that is, a draft secured at the time of acceptance by a bill of lading covering automobiles in transit is eligible for acceptance by a national bank under the terms of the law, provided, of course that it complies with the other provisions of the Federal Reserve Act and the board's regulations."

WILLYS CORPORATION BUYS TWO MORE FACTORIES.

The Willys Corporation has purchased two plants of the Duesenberg Motors Corporation, one at Elizabeth, N. J., and the other at Poughkeepsie, N. Y. It is understood some new financing will be undertaken in connection with the transaction. When it was announced that the Willys Corporation had been formed to manufacture a new six-cylinder car it was stated that this was necessary as the Willys-Overland Co. could not undertake the manufacture because its own plants were being pressed to capacity. The distribution will be through the Willys-Overland Co., which has entered into a sales agreement with the new cor-

TRUCK IS KEPT UNDER CONTROL DURING FEAT ON STEEP INCLINE



F-W-D Truck Stopped While Climbing a 66.6 Per Cent. Grade to a Platform 12 Feet Above Ground, at Billings, Mont.

KEEPING a truck under control while ascending and descending a 66 2/3% grade is the remarkable feat accomplished by H. A. Lewis at Billings, Mont. The stunt was performed on a platform of wood 18 feet long and 12 feet above the ground, with inclines 217 1/2 inches long. An F-W-D truck was used.

poration. The acquisition of the Duesenberg factories was unexpected. The Poughkeepsie factory formerly was the Fiat plant. It is intended to enlarge both plants.

OLSON CLAIMED TO BE LOWEST PRICED TWO-TON TRUCK NOW ON THE MARKET.

What is claimed to be the lowest priced two-ton truck is now produced by the Swedish Crucible Steel Co., which operates plants at Detroit and Windsor, Ont., under Olson patents. This is not a conversion unit, but is a truck chassis in which a complete Ford power plant is installed, and the wheels, axles, springs, frame and other components are of such size that an overload capacity of 50 per

A series of photographs made shows the vehicle stopped in four different positions on the incline, from which starts were made. It is claimed that the engine did not labor during the trial. While stopped the truck was held with the service brake without a wheel slipping, and the emergency brake was not used.

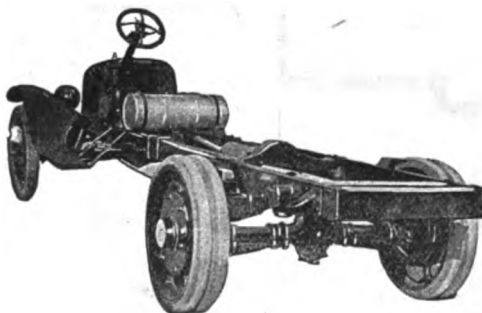
cent. in excess of the rating is guaranteed by the maker. The wheelbase is 142 inches and the frame is a size that will take a body 60 by 144 inches, or even larger. The rear axle is a patented internal gear driven type, claimed to have the largest bearings ever used for a truck, having load capacity of 11 tons each. The rear wheels are steel disc construction and are fitted with 32 by 3 1/2 inch dual solid tires.

CAPITAL IN AUTO BUSINESS.

Estimates have recently been made tending to show that the total capital of the companies engaged in the automobile business is approximately \$1,500,000,000, which is nearly \$500,000,000 greater than the total capital of national banks in the United States in 1917.

AUTOMOBILE LABORATORY.

An automobile laboratory for scientific research and testing in motor car development will be opened soon at the University of Michigan in Ann Arbor. An appropriation of \$10,000 has been made for its equipment. It is planned to install two dynamometers for engines and accessory testing and also a complete chassis-testing equipment for the determination of car and fuel efficiency.



Olson Two-Ton Truck, Claimed to Be the Lowest Priced Unit of This Capacity Sold.

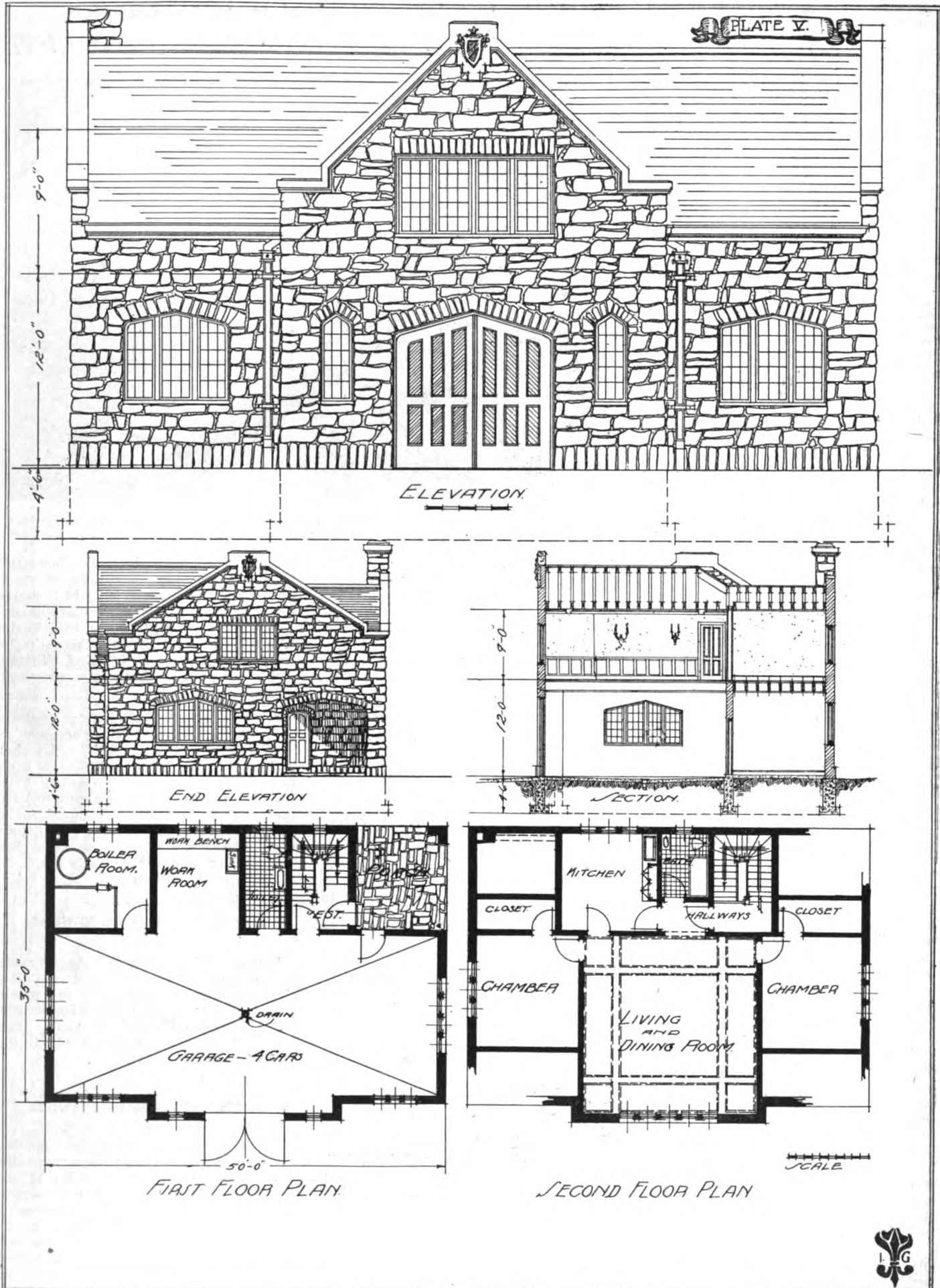


PLATE V.

GARAGE WITH CHAUFFEUR'S QUARTERS

Two-Story Stone Structure Characteristic of English Tudor Period, Embodying Low-Pointed Arch and Gabled Roof.

Designed by the Architectural Department of the Automobile Journal Publishing Co.

THE structure shown in accompanying design is of two stories, constructed of field stone, either in the rough or faced to give a flat wall effect. Its general character is that of the English Tudor period, embodying the low-pointed arch and the gabled ends of the roof. It is 35 feet wide and 50 feet long, the first story being 12 feet high and the second nine feet.

On the first floor we have storage for four cars, this being 20 feet wide and 50 feet long, with entrance directly on center as shown, occupying forward or front part of the building. This section is amply lighted, owing to the number of windows piercing the walls on all sides, a total of six openings of various sizes.

At the rear is found a boiler room, ample in size to heat the entire place, keeping at all times during the cold and severe weather a temperature of at least 65 degrees. Provision is made for coal storage.

Adjoining the boiler room and opening to the garage proper is a work room. Along under the windows a work bench has been placed, being well lighted through the large glass area afforded by the three windows. A wash sink is also provided, so that the man doing repair work has running water at hand on all occasions.

The floor of this, as well as that of the garage and boiler room, is of concrete, properly drained, insuring dryness at all times. There is a toilet, with entrance from the garage proper, and this has a tiled floor.

We next come to the stair hall, which has entrances both from the garage and outside porch. The stairway leads from the first to second floor, landing in a hallway at the second floor.

An ideal porch is provided, it being roofed over by the upper part of the building, forming an exceptionally fine place to spend a few off moments of rest.

On the second floor, the quarters for the chauffeur or care taker and his family are laid out so that they will be pleasant. The more desirable such quarters are made the more contented will be the employee and his family.

This compartment comprises a large living and dining room, with beamed ceiling, paneled walls for a height of three feet, with a chair rail as a topping member. A bank of windows affords ample light, this being in the gable over the main entrance door.

Off this room are to be found two chambers with large closets, these also being lighted with

a bank of windows as shown. From the living room and to the rear a kitchen has been provided with sink and closets, etc., for the convenience of the housekeeper.

An inner hall, off which leads the living room, kitchen and toilet, has been introduced and from this we go out into the hallway leading to the ground floor.

The foundation is of concrete, at least 12 inches thick, of a mixture of the 1-3-5, this to be thoroughly mixed and poured into true forms and tamped down to insure a good solid wall, precluding voids that might occur from irregularities of pouring and time of mixing between batches. Footings should also be included, as the weight of a building of this kind calls for it, a protection against settling unevenly, causing cracks and displacement of floors.

All walls are of field stone, except those on the interior, these being of brick and wood, owing to their positions and uses to which they are to be put. The exterior walls are laid up as shown, having equal course lines, using a good lime mortar. All exterior walls are topped off with a concrete stone coping, elevation showing just how this may be done.

The interior walls are plastered and finished off with a sand float finish, tinted in tone to suit the owner's taste.

The floor joists are hard pine for long spans, while spruce will suffice for small spans. The flooring is hard pine on $\frac{7}{8}$ -inch hemlock, boarding laid diagonally with deadening felt laid according to standard specifications.

The roof is covered with slate, color optional. All flashings are of copper laid tightly. The drain pipes from roof to soil pipe at grade are of 12-ounce copper.

The window frames are of cypress, sash of white wood $1\frac{3}{4}$ -inch type. All stock should be at least $\frac{7}{8}$ inch thick. Doors with the exception of the exterior doors should be $1\frac{3}{4}$ inches thick, paneled as shown. The exterior doors are $2\frac{1}{4}$ inches, while the large door at the garage entrance is $2\frac{3}{4}$ inches, paneled as shown.

Lighting is by electricity, to be laid out to fit the needs of the owner. Heating is by steam, wall radiation in garage, radiators to be placed beneath the windows.

The cost of a building of this type should be approximately \$5000, depending upon the material, accessibility of location from stone quarries and other conditions that enter into construction costs.

Automobile Starting, Lighting and Ignition Systems

For Detailed Chart See Pages 32 and 33.

IN A single chart it is not possible to show all forms or modifications of automobile starting, lighting and ignition systems in use. A typical system, including all important parts, is shown, and supplementary diagrams reflect several generally used systems. Regardless of type, a motor or dynamo will have the same general construction and will have similar accessories. Other units may vary in design, but the same faults will develop in all of them. The battery ignition system is in two forms: The closed circuit, as typified in the Remy system, and the open circuit as in the Delco. The timer, battery, coil and spark plugs are practically the same in either system.

The faults most probable to be met with can be set forth by stating first, how they affect the system; second, where the defects may exist in the component parts and the indications establishing their character. For lighting failure or defect, look under the heading Lighting System, and for those that may be met with in the parts, look under the unit suspected, such as for instance, Lamps or Wiring.

The system shown is a single-wire, sin-

gle-unit type and is typical of many of the cars in use. The Delco unit outlined is a one-unit, one-wire earlier form and known as the Junior system. Other systems may be one-unit, two-wire, or two-unit, one-wire, the only change in installation being the use of two wires in the former to all units and no ground connection on the metal frame of car or, in the latter, one-wire system supplying current to the current consuming devices, the current returning to battery through the metal frame of the car. The wiring of the one-wire system must be watched more carefully than that of the two-wire system, as short circuits are more probable.

Hints for Locating Delco Trouble.

1. If the starter, lights and horn all fail, the trouble is in the storage battery or its connections, such as a loose or corroded connection or a broken battery jar.

2. If the light, horn and ignition are all right, but the motor fails to turn the engine, the trouble is in the motor generator, such as dirt or grease in the motor commutator.

3. If the motor fails to turn, or turns very slowly and the lights go out or become very dim, it indicates a loose or corroded connection on the storage battery, or a battery that is nearly discharged.

4. When two set of batteries are used for ignition purposes, the following tests may be made:

If the engine fires on the "M" button, but not on the "B" button, the fault must be in the wiring between the dry cells or the wires leading from the dry cells to the switch, or depleted dry cells. If the ignition functions on the "B" button and not on the "M" button, the cause must be in the leads from the storage battery to the generator, or the lead running from the rear terminal on the generator to the switch, or in the storage battery itself, or its connection to the frame of the car.

5. If both systems of ignition fail and current is supplied from both the storage battery and the dry cells, the cause must be in the coil, resistance unit, timer contacts or condenser. This is apparent from the fact that these function for each system of ignition.

DEFECTS IN AUXILIARY UNITS

Storage Battery.

Fault.

Liquid low in one cell.
Electrolyte gravity will not rise.
Overheating.

Electrolyte leaking at top.
Battery constantly low.

Buckled plates.

Battery exhausts quickly while idle.
Frozen battery.

Rotting insulators.
Battery will not charge.
Terminals corroded.
Jars break rapidly.
Separators punctured.
Lights rise and fall.

Battery will not operate after storage.

Lamps dim although electrolyte is at high level.

Electrolyte down to 1.100.

One cell dead.

Battery dead from usage.

Large sediment deposit.

Cause.

Cracked or broken jar.
Sulphated.
Liquid low or charged too rapidly.

Solution too high.
Under charging.

Overheating.

Short circuits.
Discharged in cold weather.

Impure water, too much acid.
Connectors loose or crystalized plates.
Acid leak through vent.
Battery not properly fastened down.
Overheating.
Battery low.

Should have been kept charged.

Specific gravity too low.

Overdischarge.

Insulation destroyed.

Using without restoring.

Active material dropping.

Restoration.

New Jar.
Take to experienced battery man.
Refill with water and inspect regularly, or alter generator.
Draw out a quantity with syringe.
Examine generator brushes; if right, increase charging rate and charge battery from an outside source.
Charge at lower rate, keep liquid in cell, keep temperature below 110 degrees.
Examine wiring and renew insulation.
Damage may be irreparable, charge for crystallization.
Use distilled water or melted artificial ice.
Resolder connectors and plate holders.
Clean with ammonia or washing soda.
See that cleats and bolts are drawn tight.
Renew separator and keep battery filled.
Recharge outside or by a long run at 20 miles per hour.
Probably cannot be repaired owing to disintegration.
Bring specific gravity up to 1.275 by charging, see that the generator gives 20 per cent. more current than lamp consumption.
Give reforming charge at three amperes until maximum density is reached.
Watch overheating and overcharging, keep electrolyte up.
Charge for 24 hours at rate marked on battery or until electrolyte reaches 1.275.
Take battery to service station at once, as material has become loosened.

Care of the Battery.

The battery should be regularly inspected, either by a competent battery repairer or by the motorist, to see that the electrolyte does not drop too low; the electrolyte should be kept about one-half inch over the top of the plates by adding distilled water only. The specific gravity of the electrolyte gives an indication of the charge, providing that the solution is made up of the proper proportion of chemically pure sulphuric acid and water, as given in the instructions furnished by the manufacturer. The specific gravity should be tested regularly every two weeks with a hydrometer syringe, which may be purchased from any supply house or service station. A complete discharged battery containing the proper solution will indicate from 1.100 to 1.150, and a well charged battery will indicate about 1.275 to 1.300. Each cell should be tested separately and care taken to empty the syringe completely before testing the next.

When the battery is fully charged and gassing freely, the specific gravity should be between 1.275 and 1.300. If higher than 1.300, distilled water should be added in small amounts till the reading reaches normal. If lower than 1.275 and charging for a longer period does not make the reading normal, take the battery to a good repairer. Usually water only will be required. In adding acid, follow closely the instructions furnished with the battery or, better still, allow an experienced battery repairer to add the acid.

Motors and Generators and Their Faults.

The manufacturers of electric starting and lighting systems have made every effort to have the various units function as nearly automatic as possible, but it is evident that some attention will be needed by the various units. The generator should be examined occasionally and if carbon dust, worn from the brushes by the commutator, is deposited in the lower part of the case, it should be blown out with air pressure. An accumulation of this dust may result in a ground to the generator case or produce a short circuit between the brush carrier and the case.

If the commutator is black or roughened it must be smoothed down with fine sandpaper while the armature is rotating. Emery cloth should not be used, as particles of the emery will stick into the metal of the commutator and wear it unnecessarily. Apply the sandpaper between the brush and the commutator, sand side down, as by this method a true

surface is gained. Never use a block of wood, as the resulting surface will be uneven.

After smoothing down the commutator remove all particles of metal which may bridge the segments, causing a short circuit. The insulating material, which is mica, fitted between the copper segments, should not be higher than the segments and if any projects higher it should be cut down with a broken hack saw blade fastened to a handle, or by using a small file.

Commutator and Brushes.

Examine commutator occasionally by removing spring collar or holder over the brushes. Keep the commutator free of dirt or oil, cleaning it when dirty with a cloth, not waste. When the commutator and brushes are in good condition they will be glazed and the commutator will be a chocolate brown color. Never remove the brushes save in case of trouble. If the brushes are worn too badly they should be renewed, and when fitting new

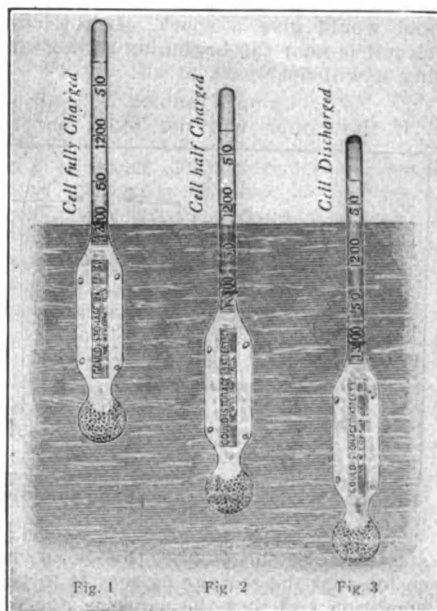
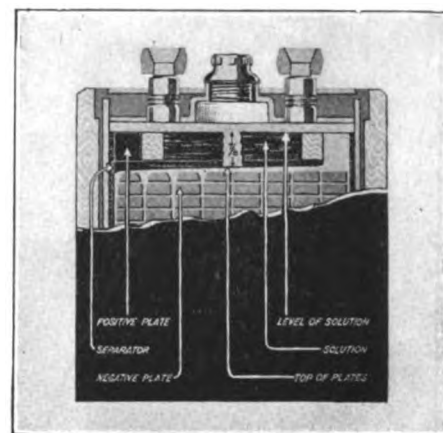


Fig. 1 Fig. 2 Fig. 3
Cut Showing State of Charge of Cell as Indicated by Density of Solution.

brushes care should be taken to see that they fit accurately. The best method of fitting them is to place each brush in the holder, put a strip of sandpaper around the commutator with the sand side next to the brush, and pull the strip forward and back several times against the face of the brush. In this manner a perfect seat will be obtained and the brush will

fit the commutator evenly. In removing the brushes that are to be used again, mark them in such a manner that they may be replaced in the original holder, from which they were taken and seated exactly as they were before removal.

When generator is inoperative this may indicate an open field, or a field



Sectional Cut of Storage Battery.

with two adjacent poles reversed, an open circuit in wiring or connections, or the armature open on opposite sides. This failure may also be caused by the solder breaking at the ends of the coils, where they are soldered to the segments of the commutator. The armature may have become overheated, the solder melted and thrown out, so the wires rest freely in the slots. Some current flow will be shown when a test is applied with test lamp, but by testing with a volt-ammeter the exact reading of each coil may be obtained and the cause readily located.

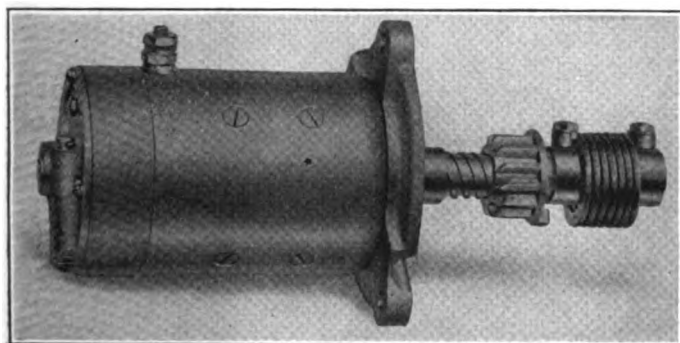
If the generator will not develop current the cause may be dirty or badly burned relay contacts, an open circuit in the wiring or connections, a fuse out, the battery very badly discharged or sulphated, or the brushes poorly fitted.

Low generator output, with normal or low voltage, may indicate that the regulator needs adjustment (that is, the spring holding contacts in the closed position may need adjusting to hold the contacts closed longer); that there are dirty or burned regulator contacts, the armature is short circuited, a badly discharged battery, the field coils connected wrong or partly shorted, or the third brush may require regulating on generators using a third brush.

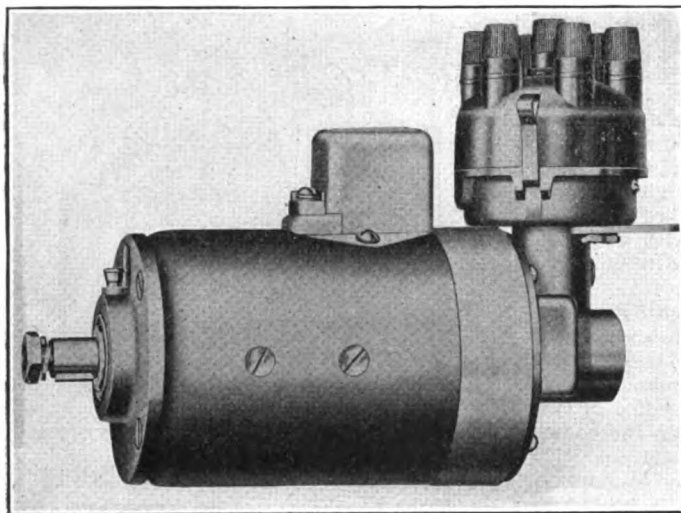
Low output with high voltage indicates loose connections in battery circuit or a battery open circuit.

High generator output may be caused by only one regulator point making contact, thereby cutting only half of the regulating resistance into the field circuit; or the regulator contacts may need adjusting so that the spring will not hold them in the closed position too long.

All generator brushes should be set in the position of least sparking when carrying a full load; this position will be located a short distance ahead in the direction of rotation from the neutral plane. The brushes are in the neutral plane when at the position where the current is reversing in the winding, and, therefore, at the position where the highest voltage is obtained between brushes of opposite polarity. This position may be located by connecting a voltmeter between the brushes and moving the rocker ring until the point of highest voltage is reached. The voltage will decrease as the brushes are moved away from the neutral plane.



Gray & Davis Starting Motor.



Gray & Davis Generator and Distributor.

To adjust the third brush on generators of the Delco type the following rule is followed: The adjusting arm is made in two pieces. The part to which the brush is fastened has a slot, through which pass two screws, attaching it to the other part. By loosening the screws it is possible to slide one part upon the other, and so increase or decrease the length of the arm. When the arm is shortened, the charging rate is decreased, and lengthened the charging rate is increased. Care should be taken to sand in the third brush each time that it is moved, so that a true contact will be made with the commutator. The screws on the adjusting arm should be tightened carefully after each change of the brush, to prevent slipping. The charging rate should rise to its maximum at a car speed of from 15 to 20 miles per hour, and then drop off as the speed increases beyond this point. The charging rate should be limited to 12 to 14 amperes with lights off. This work had best be done by an expert in electrical work.

Setting Motor Brushes.

Motor brushes should be set at the position of least sparking when the machine is carrying a full load. This position will be located a short distance back (in the direction opposite to rotation from the neutral plane). To set motor brushes in the correct position, place the motor on block test and apply a load approximately equal to that which it is normally required to carry. (This load will be about 40 pounds, on a pulley of six inches diameter, or 10 pounds for starting motors.) The speed of the motor is greatest when the brushes are at the neutral plane and decreases as they are moved away from that position. The voltage of a generator and speed of a motor may be changed considerably by moving the brushes, providing the machine is not loaded so that it will spark badly. It would be best to have this work done by an experienced electrician.

Ignition Coil Test.

A good ignition coil should produce a spark that will jump at least a one-fourth inch gap. Put the coil on test and notice what it will do. If a good fat spark is

produced and does not miss after several hours continuous running of the engine, that is, after it has become heated, it may be considered a good coil and fit for service.

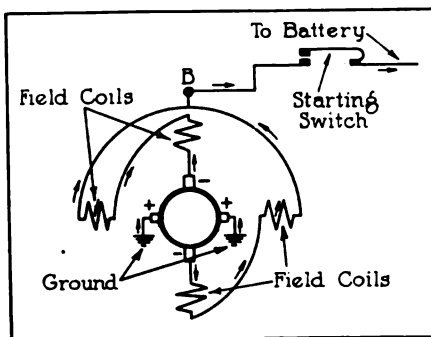
The Delco ignition coil is readily tested by the "test points." The primary circuit is tested between the terminals on the top of the coil.

The secondary winding may be tested for open circuit by testing from the high-tension terminal to either of the other terminals. In some instances a

coil may have its insulation short circuited for only half its length of winding and would give a spark. If the short circuit is near the beginning of the winding it will not spark at all.

Lamp Troubles.

If the lamps will not light, but the



Internal Wiring Diagram of the Starting Motor.

starter turns the engine, this is an indication that the storage battery is in good condition and that the cause is due to a burned out or broken lamp filament or defective lamp fuses. If the lamps burn brightly, but fail to illuminate the road

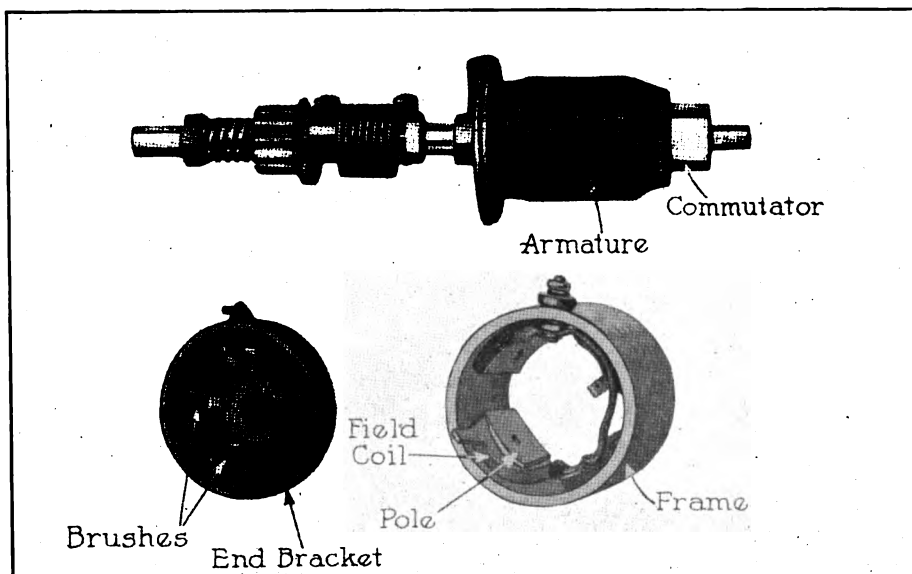
sufficiently, the bulbs may be out of focus or the lamp supports may be bent in such a way that the rays of light may be directed too far upwards. If the lamps burn dimly, or not at all, and it is difficult to turn the engine with the starting motor, this indicates a weak or discharged storage battery. In addition to this, the lamps may be old and have blackened insides, the system might be slightly short circuited, or considerable resistance may exist, due to loose or dirty connections.

If the lamps blacken or burn out quickly they are not of the proper quality. The one exception is the tail or dash lamp when connected in series, three-volt lamps being used in this case. Burning out of the lamps may be caused by the regulator not working properly, and if this is the case the lamps will burn out at high engine speed. If the lamps flicker and the ammeter indicator needle is unsteady, look for loose connections in the light wires, loose connections between battery and generator, a loose contact at a lamp connector or lamp bulb, a poor contact between fuses and fuse clips, or an exposed wire touching the frame intermittently.

Circuit Breaker Troubles and Adjustment.

Circuit breaker points should have a clean, smooth surface and make good contact. One of the points is mounted on the end of a screw which may be adjusted in or out, increasing or decreasing the circuit breaker gap. This gap should be adjusted to .020 to .025 inches. Three different metals are used for these points, silver, platinum and tungsten. With some systems an automatic reversing switch is included as the metal is carried from the positive to the negative contact across the gap and builds the negative and reduces the positive contact. The degree of deposition differs with different metals. The preference among manufacturers of electrical instruments is to use platinum or platinum-iridium points, which have the greatest resistance.

The circuit breaker is a protective device, which takes the place of a fuse



Disassembled Starting Motor with Bendix Drive.

block and fuses, preventing the discharging of the battery or damage to the wiring, lamps, horn and ignition, in case any of the wires leading to these parts become "grounded." As long as the lamps, horn and ignition are using the normal amount of current the circuit breaker is not affected. But in the event of any of the wires becoming grounded, an abnormally heavy current is conducted through the circuit breaker, thus producing a strong magnetism which attracts the pole piece and opens the contact. This cuts off the flow of current, which allows the contacts to close again and the operation is repeated, causing the circuit breaker to pass an intermittent current and give forth a vibrating sound. It takes 25 amperes to start the circuit breaker vibrating, but once started, three to five amperes will cause it to continue to operate.

In case the circuit breaker vibrates repeatedly, do not attempt to increase the tension of the springs, as the vibration is an indication of a ground in the system. Remove the ground and the vibration will cease.

If the circuit breaker indicates a grounded wire, the cover of the junction box on the dash should be removed, and the line which is grounded should be opened at the terminal on the junction block. If the circuit breaker stops vibrating when this is done, the ground must be in the line after it leaves the junction box. If it continues the ground is in the switch or ignition circuits.

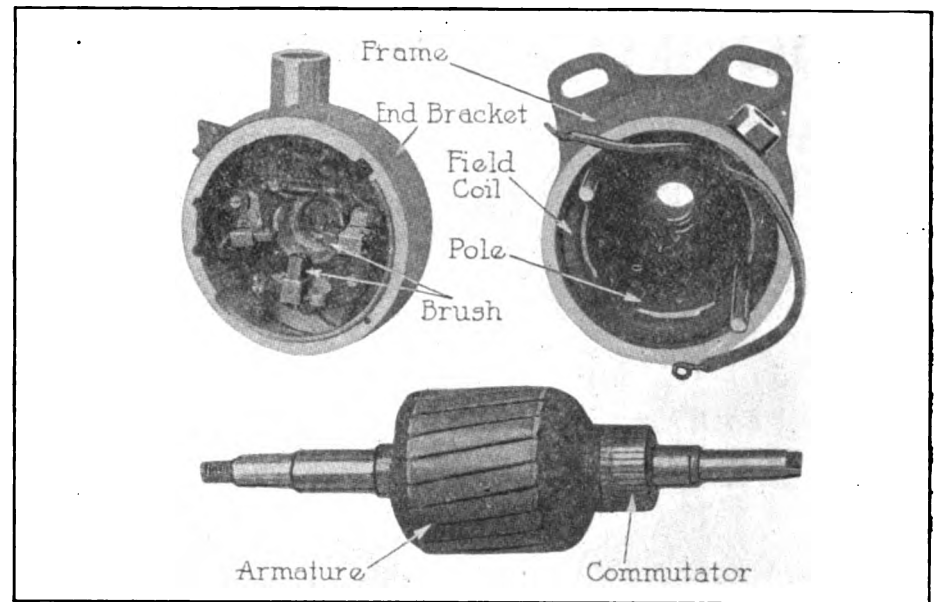
In case the circuit breaker continues to vibrate when all the buttons on the combination switch are depressed, the trouble is almost sure to be in the horn or its connections.

Starting Switch.

Oil should not be applied to the starting switch where it is liable to reach the contacts. Parts that have either a sliding or turning motion should be supplied with oil and that in small quantities. In the switch for the automatic pinion shift, the moving contact should close firmly against the stationary contacts, and the return spring in the switch should separate the contacts positively when pressure is removed from the foot button.

High Resistance.

High resistance may result from poor-



Gray & Davis Generator, Showing Arrangement of the Brushes.

ly made or dirty connections, wires that are partially broken through, wires that are too small for the work they are intended to do, or dirty, pitted and corroded contacts in generator, cutout, or regulating parts. A high resistance connection frequently develops at the battery when the battery terminals become corroded. Too much stress cannot be laid upon the consideration to be given the battery terminal connections. If it is found that corrosion has taken place, the terminals should be loosened, the ends brightened with emery cloth, coated with vaseline both on the ends and the inside of the holders and the terminals made fast. Occasionally the terminals will become loose on the battery, due to the vibration of the car, and should be frequently examined.

Starting Motor.

The closing of the starting switch completes the circuit and puts the starting motor in operation. If it does not turn the engine, release the switch at once, ascertain if all connections are tight and if the motor brushes are fitting the commutator, and inspect the battery. If the starting motor turns the engine over very slowly, it is evident that the

battery is weak or the engine exceptionally stiff, probably from overheating or lack of lubricant. If the starting motor is turning the engine at a reasonable cranking speed and the engine does fire, the cause will not be found in the motor.

Summary of Starting Failure Causes.

Starting motor cranks very slowly: Indicates battery almost discharged, battery sulphated, engine stiff, brushes loose and poor contact.

Starting motor does not rotate: Battery may be discharged, starting switch not making good contact, motor brush may not make contact with commutator, battery terminals may not make good contact, switch contact poor.

Starting motor rotates but does not crank engine: Roller clutch does not function, gears not properly meshed; if Bendix automatic, spring may be broken.

Starting motor turns and engine will not pick up under its own power: These indicate that the trouble is not in the starting system, Bendix starter gear on threaded shaft may be stuck or spring broken.

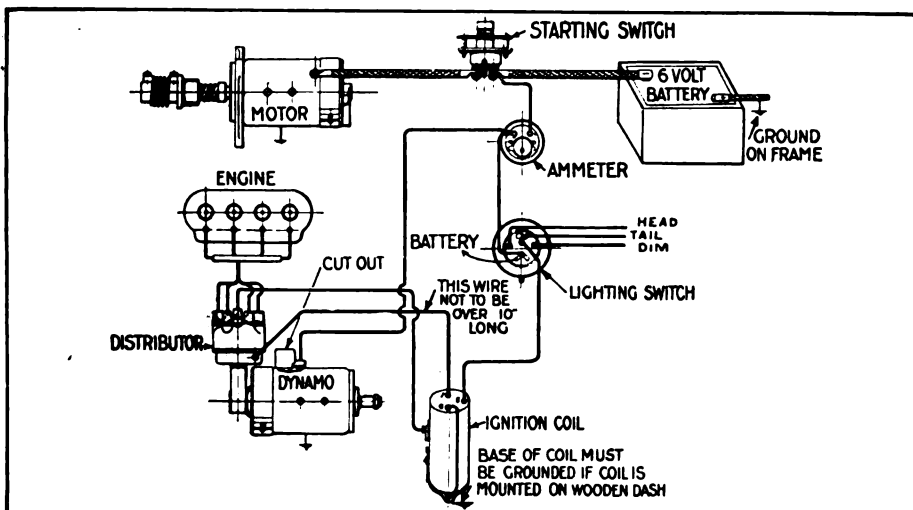
A weak starting motor is sometimes caused by using carbon brushes. The latter have three to four times the conductivity, and for this reason their replacement by cheap carbon will not allow sufficient current to pass.

If the battery is normal examine the connections, beginning with the battery. The current may be shorted, due to electrolyte spilled over the top of it; or the terminals may be sulphated, in which case resistance to the current may prevent the motor operating.

Scrape off the sulphate and wash all the surrounding metal parts in carbonate of soda or some other convenient alkali. Then replace the wires and coat them thoroughly with vaseline to prevent further corrosion.

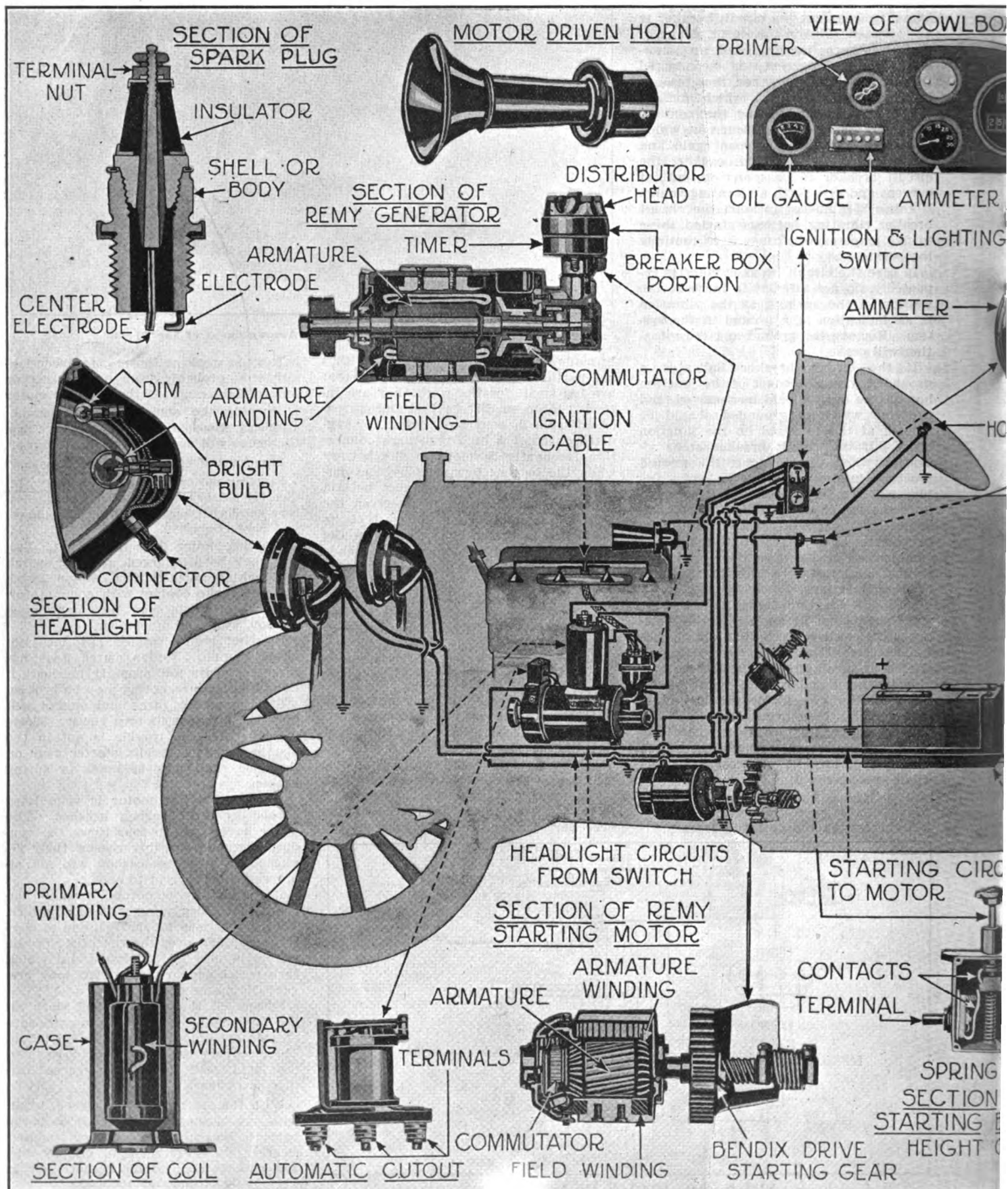
With the starting switch closed, begin with one of the wires running from the battery, loosening the various connections in the starter circuit one by one, and note at each point whether there is

(Continued on Page 34.)

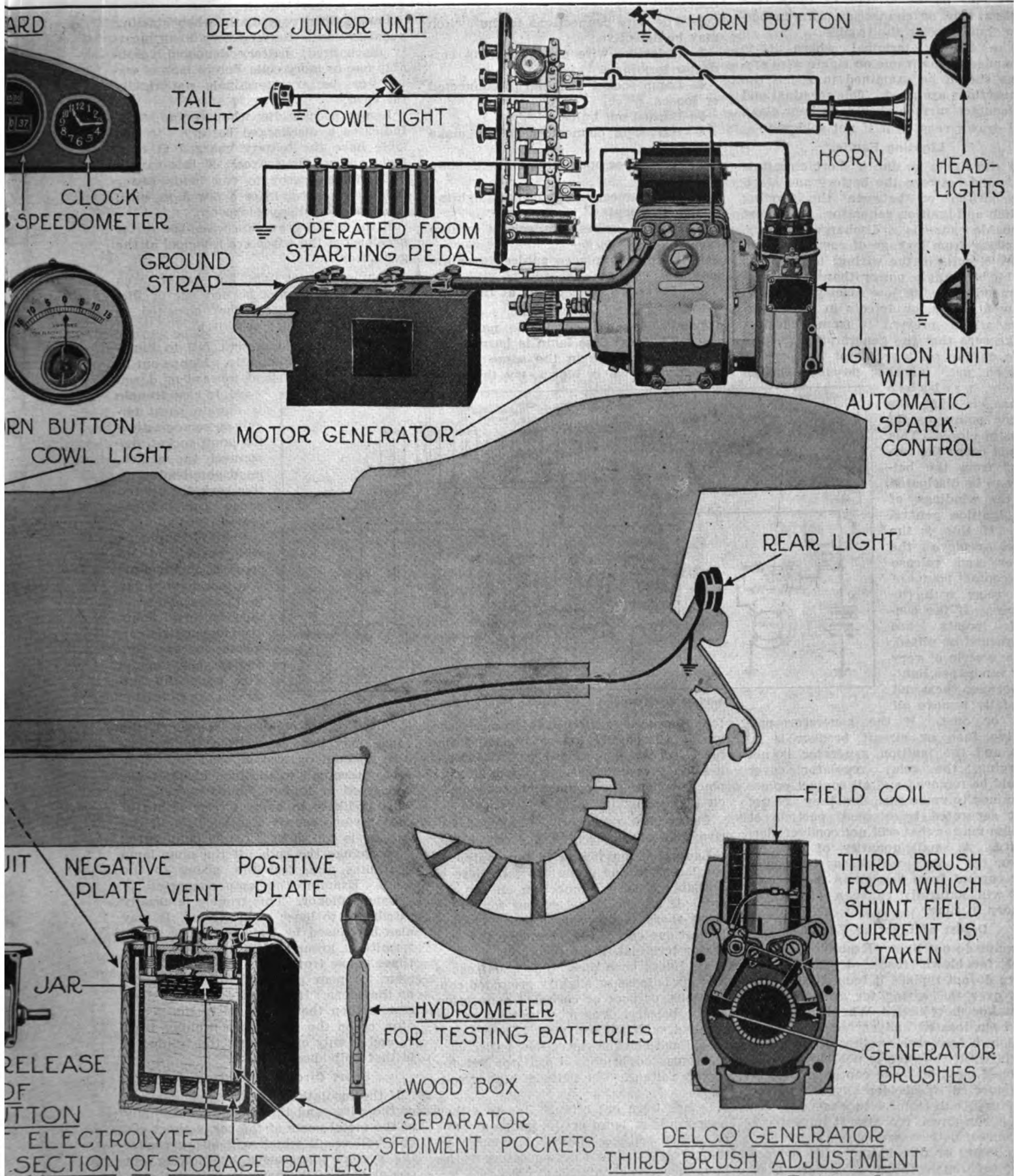


Gray & Davis Two-Unit Wiring Diagram.

Modern Starting, Lighting and Ignition



Ignition Systems Used in Automobiles



(Continued from Page 31.)

current flowing by pulling the wire away from the terminal. If there is no current the motor will not operate, and either there is a dead short circuit in some part of the system, or there is a broken wire or connection. An inspection should locate the trouble.

The battery terminal where it is grounded to the frame on single wire systems should be examined to see if the connections are good. This terminal and its contact surface should be kept clean and drawn very tight if not soldered.

Lighting Faults.

If the lights go dim a short circuit is indicated between the battery and starting switch or between the starting switch and ignition generator. The most probable cause is a discharged battery, resulting from leakage of current due to short circuits in the wiring; using bulbs of higher candle power than those recommended; using low efficiency carbon filament bulbs, or defects in the generator which prevent it from charging. Make sure that the generator protective fuse on the relay regulator base is not burned out. Another possible, though hardly probable cause, is that the relay points might remain closed. This would cause the current from the battery to be dissipated in the windings of the ignition generator. If this is the case, remove the cover and release the contact points of the relay with the fingers. If the contact points are roughened or pitted, draw a strip of very fine sandpaper lightly between them and carefully remove all dirt or dust. If the generator protective fuse or circuit breaker is intact and the ignition generator is not charging, the relay regulator cover should be removed and all contact points examined to make sure that they are not kept separated by a small particle of foreign matter that will not conduct electricity. A small quantity of dirt between the points will keep the generator current from flowing to the battery and will naturally cause a discharged battery in time.

Digest of Lighting Faults.

Lamps do not light. Examine the fuse block for blown fuses. If the fuse is blown do not replace it immediately, but look over the wiring for an accidental ground or short circuit. When the trouble has been located and corrected, replace the blown fuse with another of the same capacity. If the fuse is not blown, look for open circuits, loose contacts, battery disconnected or accidentally run down, or burned out lamps. In case the battery is run down, recharge it immediately from an outside source.

No lights or dim lights, with the engine running: There is a group of

troubles which may be classified under the general head of open circuits. Eleven of these are very prominent:

- 1—The generator terminal or brush connections may be loose or making poor contact.
- 2—The wire connections to the switch may be defective.
- 3—Defective wire connections to connector terminals.
- 4—Lamp socket terminal disconnected or loose.
- 5—Burned out bulbs.
- 6—Halves of connectors do not make contact.
- 7—Bulb bases not contacting with lamp sockets.
- 8—No connections between lighting switch terminals.
- 9—Broken wires, especially where taped.
- 10—Joints or places subject to abrasion.
- 11—Defective connections at the lamp sockets.

Lamps in one circuit do not burn, caused by: (a) The lamp is burned out. Try another lamp in the same socket. (b) If the fuse is blown, try the same

Lamps flicker and ammeter unsteady. Loose connections in light wires, loose connections between battery and generator, loose contact at lamp bulb, exposed wire touching the frame intermittently, causing a short circuit.

Lamps burn very dimly when starting pedal is used. Battery very weak, nearly discharged; battery damaged, probably one or more cells, due to lack of water, or battery terminals not rigidly fastened.

Lamps become dim when engine stops. Indicates a discharged battery. If possible have the battery charged at once from an outside source. If this cannot be done, endeavor to run with fewer lights than normal, for a few days, until the battery voltage picks up.

If the lights grow dim when the car is accelerated the wires are reversed at the generator.

Lamps will not light, but starter turns the engine. Lamps burned out or filament broken, system short-circuited or open circuit, at fuse or switch.

Lamps burn bright, but fail to illuminate the road sufficiently. Lamps out of focus or brackets bent upward or downward.

In case trouble is due to short circuit on some particular lamp socket, disconnect the attachment plug leading to this socket until the cause can be repaired.

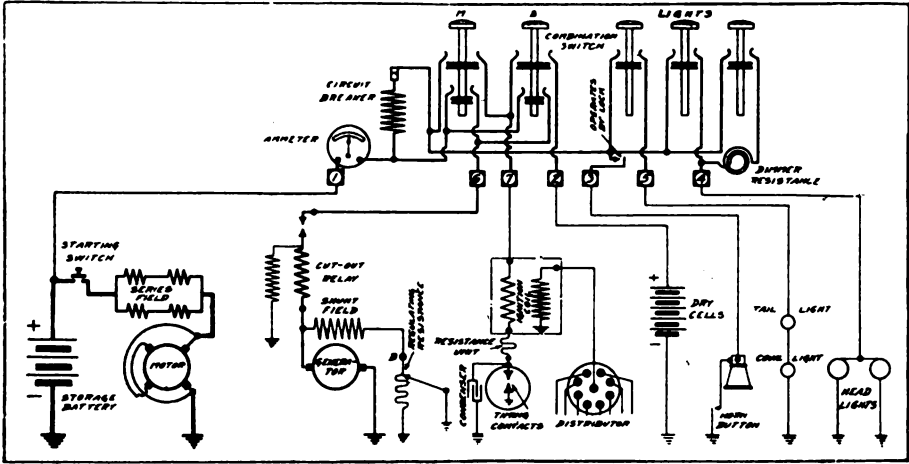
None of the lamps will burn, and no spark is obtained for ignition, may be due to the terminals of the battery being disconnected or corroded, so that contact is poor. Ground wire from the battery to the chassis is disconnected or

broken. If the ignition is normal, the cause may be: Lead from the battery disconnected or broken, lead from generator terminal to the fuse block is disconnected or broken, lamps burned out. This is likely to happen from either of the previous causes mentioned, or if the battery is run down. If one lamp burns dim, change the bulb. If the same lamp continues dim, test the wiring to the lamp. Examine the lamp connector.

Lamps flicker. This trouble is usually attributed to loose connections. It may also be caused by bad contact or an intermittent ground. Vibration will sometimes cause trouble of this nature to appear. A poor ground connection might be the cause. If all lights flicker instead of one then the trouble is in the generator, or on the main lines running from it, and if only one flickers the trouble is in that individual circuit.

Short Circuits and Grounds.

If the insulation is worn from any one of the wires and the copper touches any of the metal parts of the car, a short circuit will result which will either render the system inoperative by blowing out one or both of the fuses or will discharge



Wiring Diagram of Cole Eight Delco One-Unit.

fuse in another circuit. Examine the wiring thoroughly before replacing the fuse. (c) An open circuit, or broken connection in the wiring. Examine the places where the connections are made on that particular circuit.

Fuses blow repeatedly. Lamps defective or a short circuit. Try new bulbs.

Lamps go out for an instant only. If the lamps in one circuit so fail there is probably a loose connection on the circuit. If all the lamps go out for an instant there is probably a loose connection at one end of the wire from the generator terminal to the fuse box.

All lights burn dim. The usual cause for this is loose or slightly grounded connections, or poor or corroded connection at the battery. Possibly the battery has not had sufficient charging. Lamps may be old and blackened, try new bulbs.

Lamps too bright. Regulator set for higher voltage. Use bulbs of higher voltage.

Lamps burn out often. Due to either poor grade of lamp or the lamps are not of proper voltage. With the dynamo on the regulator cut out not operating or the lamps may be of inferior grade.

the battery. Short circuits may result from two bare wires coming in contact, but in general, where short circuits are mentioned a contact of a bare wire with some of the metal parts of the car is referred to. By "open circuits" is meant broken wires, fuses burnt out, or proper connections not made to the frame. It must be borne in mind that as the frame of the car forms one-half of the electrical circuit between the lamps, the ignition switch and the battery, the frames of the lamps and the terminals of the ignition switch and battery should be well grounded to the frame of the car at all times. In the Delco system, fuses are replaced by a protective circuit breaker which opens and vibrates when any wire is shorted, thus giving a warning.

The Lamp Test.

Probably the simplest and most convenient method of testing for shorts and open circuits is by a test lamp. This may be arranged by making use of a dry cell, storage battery or the regular lighting current. If one side of the ordinary drop cord, as used for shop and garage lighting, is opened, the lamp may be used as a test lamp. Cutting one wire will open the circuit and prevent the lamp from lighting as long as the two ends are separated, but when the two ends are brought together the circuit will be complete, as will be indicated by the lamp lighting. The lamp may be used as a tester by touching the two free ends to any points between which it is desired to make a test. If the lamp glows it is an indication that the circuit is complete, if not, the circuit is broken and a broken wire should be looked for, as an open circuit is indicated.

In case it is desired to know whether or not a wire is grounded, one of the test wires may be touched to the frame of the car and the other to the wire to be tested. If the test lamp is lighted it indicates that the wire is in electrical contact with the frame of the car and is therefore grounded. In making the test on a grounded system care should be taken to have the wire or circuit being tested disconnected from the frame of the car in all places where it is supposed to be connected, as in this case the lamp will light if a single connection is left.

IRREGULAR RUNNING OF ENGINE AND MISFIRING.

Faults of Ignition System.

Wiring or terminals loose.
Spark plug insulator broken.
Spark plug points sooted or oily.
Spark gap at plug points adjusted wrong.
Secondary cable leaking.
Primary wire prematurely grounded.
Battery discharged.
Adjustment of contact points at timer poor.
Broken wire inside of insulation.
Platinum points in magneto loose or improperly adjusted.
Contact spring weak or roller worn.
Collector brush or pencil broken.
Distributor casing or contact breaker dirty or too much oil.

TROUBLES IN IGNITION SYSTEM

Trouble.	Cause.	Repair.
Worn or pitted contact segments	Misfiring	Smooth down by grinding
Pitted platinum points	Misfiring	Smooth with oil stone or very fine file
Metal dust or dirty oil	Misfiring	Clean thoroughly
Worn bearing	Misfiring	Renew bearing
Terminals loose	Misfiring	Tighten
Revolving contact brush	Misfiring	Renew brush.
Out of time	Irregular spark	Reset timing gears.
Burnt out resistance unit	No spark	Replace with new.

INDUCTION COIL.

Defect.	Cause	Repair.
Loose terminals	Misfiring	Tighten
Defective condenser, defective wiring	No spark	Return to factory
Connections broken	No spark	Renew joints
Switch contact poor	Misfiring	Tighten
Internal wiring broken	No spark	Repair
Coil unit dead	No spark	Return to factory

WIRING.

Defect.	Cause.	Repair.
Loose terminals	Misfiring	Tighten
Broken plug terminal	One cylinder will not fire	Renew
Timer wire broken	Coil will not operate	Try another coil or replace
Broken battery or ground wire	No spark	Replace
Chafed insulation or short circuit	Misfiring	Renew or insulate wire

SPARK PLUGS.

Defect.	Cause	Repair.
Cracked porcelain	Plug inoperative	New porcelain
Porcelain oil soaked or wet	Plug misfires	Clean plug
Carbon deposits	Plug short circuited	Remove and clean
Porcelain loose	Plug misfires	Tighten bushing
Broken gasket	Lost compression	New gasket
Loose electrode in shell	Plug misfires	Tighten or renew
Loose wire in porcelain	Plug misfires	Tighten
Air gap too close	Spark short circuited	Correct setting
Air gap too wide	Spark will not jump	Set points 1/32 inch apart
Terminal loose	Plug may misfire	Tighten
Loose plug in cylinder	Compression leaks	Tighten
Mica insulation oil soaked	Short circuits plug	Replace

Cam or contacts in timer worn.
Oil in timer dirty or too thick.
Pitted contact points in timer.
Coil winding or condenser punctured.
Distributor contact segments rough.
Storage battery terminals sulphated.

Points Worth Remembering.

In replacing worn out motor or generator brushes use only those supplied by the manufacturer and fit them properly.

In lubricating the motor or generator, the commutator may be omitted. If lubrication is needed use a small quantity of vaseline and wipe off with a cloth.

In washing the car, cover the engine with a waterproof covering so that the motor and generator will not collect moisture.

Use the starter with care; do not try to propel the car with starter; the engine was put into the car for this work.

Adjustments to the circuit breaker should be made at the factory that manufactured the system.

When the system is operating well do not meddle with it. Serious damage may result.

If necessary to operate the car with a dead storage battery, this may be safely done, till a service station is reached. Do not disconnect the terminals of the

battery as serious damage will result to the generator.

In making repairs to the electrical apparatus, especially if it is to be removed, disconnect the storage battery before starting work. Removing the ground connection will be sufficient.

REMOVING FORD RADIATOR.

When removing the radiator of a Ford chassis the bolts holding it in place may turn and removal be difficult. But if the radiator hose is disconnected first and the radiator tipped forward, the nuts may be easily removed.

Most Ford timer wires are ruined by oil around the timer. This can be prevented by covering the wires when they are new with shellac for about six inches of their length. Then wrap the wires with tape and give another coat of shellac and allow it to dry thoroughly.

Place a piece of fine mesh wire cloth next to the copper gasket, between the carburetor and the intake manifold. This screen will break up the gasoline, causing it to vaporize readily.

Sometimes the large nut that holds the exhaust manifold and muffler pipe loosens and is hard to keep tight. Drill a 1/4 inch hole through both nut and pipe and put in a wire nail the same size.

PASSENGER CAR SPECIFICATIONS

FOUR-CYLINDER MODELS.

Name and Model	Engine	Ignition	Starting Lighting	Car.	WB.	Tires
Allen 43	3½x5	Conn	A-L	Stru	110	32x4
Argonne	3¼x5½	.....	West	.....	119	32x4
Bell	3¼x4¼	A-K	Dyn	Stm	114	31x4
Biddle H	3¼x5½	Eis	G & D	Zeni	121	32x4
Briscoe B4-24	3 3/16x5½	Conn	A-L	Bulck	104	30x3½
Chevrolet 490	3 11/16x4	Remy	A-L	Zeni	102	30x3½
Chevrolet FB	3 11/16x5½	Remy	A-L	Zeni	110	33x4
Crow-Elkhart CE-36	3½x5	Conn	Dyn	Zeni	115	32x3½
Dispatch G	3¼x5	Bosch	USL	Ray	120	34x4
Dixie Flyer H-S-50	3¼x5	Conn	Dyn	Stm	112	32x4
Dodge Bros.	3¾x4½	Own	N-E	Stew	114	32x3½
Dort II	3¼x5	Conn	West	Cart	105½	30x3½
Elcar DF	3½x5	A-K	Dyn	Cart	116	32x3½
Essex A	3½x5	Delco	Delco	Own	108½	32x4
Ford T	3¼x4	Own	.....	Holl	100	30x3½
Harroun A-1	3¼x5½	A-K	Remy	Stm	106	30x3½
Hupmobile R	3¼x5½	A-K	West	Stm	112	32x4
Maxwell 25	3¼x4½	A-K	Simms	John	109	30x3½
Merced 4	3¾x6¾	Berl	West	Ball	132	32x4½
Moline-Knight L	3¼x5	Conn	A-L	Schb	118	34x4
Moline-Knight G	4x6	Conn	A-L	Schb	122	35x4¼
Monroe	3¼x4½	A-L	A-L	Zeni	115	32x3½
Moore	3¼x4¼	Conn	A-L	Marv	106	30x3½
Nelson	3¼x4¼	Bosch	USL	Zeni	104	32x4
Norwalk	3½x5	Delco	Delco	Cart	117	32x3½
Olympian 45	3¼x4½	Conn	A-L	Stm	112	32x3½
Overland 90	3½x5	Conn	A-L	Till	106	31x4
Revere	4½x6	Bosch	West	Mill	131	32x4½
Seneca	3¼x4½	Remy	Remy	Schb	108	30x3½
Stearns SKL4	3¼x5½	West	West	Schb	125	34x4½
Studebaker SH-4-40	3½x5	Remy	Wag	Stm	112	32x3½
Stutz G	4½x6	Delco	Remy	Stm	(120)	32x4½
					(130)	
Templar A-445	3¼x5½	Simms	BiJur	Zeni	118	32x4
Willys-Knight 88-4	4½x4½	Conn	A-L	Till	121	34x4½

SIX-CYLINDER MODELS.

American B	3½x5	A-K	West	Zeni	122	32x4
American Beauty	3¼x4½	G & D	G & D	Ray	121	33x4½
Anderson	3¼x4½	Conn	West	Zeni	120	33x4
Auburn	3¼x4½	Remy	Remy	Ray	120	33x4
Buick K-6-44-47	3¾x4½	Delco	Delco	Mar	118	33x4
Buick K-6-49-50	3¾x4½	Delco	Delco	Mar	124	34x4½
Case U	3½x5½	West	West	Ray	126	35x4½
Chalmers 6-30	3¼x4½	Remy	A-L	Stm	(117)	32x4
					(122)	34x4
Chandler	3½x5	Bosch	West	Ray	123	(33x4)
						(34x4½)
Cleveland	3x4½	G & D	G & D	Stm	112	32x4
Columbia D-C and C-S	3¼x4½	A-K	W-L	Stm	115	32x4
Crow-Elkhart CE-46	3¼x5	Conn	Dyn	Zeni	116	33x4
Davis 51-54	3¼x4½	Delco	Delco	Stm	120	33x4
Dorris 6-80	4x5	Bosch	West	Stm	133	35x5
Elcar	3¼x4½	A-K	Dyn	Stm	116	33x4
Elgin H	3½x4½	Wag	Wag	Stm	118	33x4
Franklin 9B	3¼x4	A-K	Dyn	Own	115	32x4
Grant G	3x4½	Remy	Wag	Stm	114	32x3½
Hanson	3¼x4½	A-L	A-L	Stm	119	32x4
Haynes 45	3½x5	Remy	L-N	Ray	127	34x4½
Hollier 206	3¼x4½	Remy	Split	Stm	114	32x4
Holmes	3¼x4½	Eis	Dyn	New	126	34x4½
Hudson Super-6	3½x5	Delco	Delco	Own	125½	35x4½
Jones 28	3½x5½	Remy	West	Ray	126	34x4
Jordan J-60	3½x5½	Del	BiJur	Stm	127	32x4½
Kissel Kar	3 15/16x5½	Remy	Remy	Stm	124	32x4½
Kline Kar 6-42-H	3¼x4½	Conn	West	Ray	121	33x4
Lexington R-19	3¼x4½	Conn	West	Ray	122	34x4
Liberty 10-B	3¼x4½	A-K	Wag	Stm	115	32x4
Locomobile 48	4½x5½	Berl	West	Ball	142	35x5
Madison	3¼x5	A-K	West	Stm	115	33x4
Malbohm B	3¼x4½	A-K	Wag	Stm	116	32x3½
Marmon 34	3¾x5½	Bosch	BiJur	Stm	136	32x4½
McFarlan	4½x6	Bosch	West	Stm	136	35x5
Mitchell E-40	3¼x5	Remy	Remy	Ray	120	33x4
Monitor	3¼x4½	Dyn	.....	Stm	117	33x4
Moon 6	3¼x4½	Delco	Delco	Till	118	32x4
Moon 6-66-19	3½x5½	Delco	Delco	Ray	125	35x4½
Nash 681-6	3¼x5	Delco	Delco	Mar	121	33x4
National	3½x5½	Delco	West	Ray	128	34x4½
Oakland 4-B	2 13/16x4¾	Remy	Remy	Mar	112	32x4
Oldsmobile 37-A	2 13/16x4¾	Remy	Remy	John	112	32x4
Owen-Magnetic W-42	4x5½	Bosch	Own	Zeni	142	35x5
Paige 6-40	3¼x5	Remy	G & D	Stm	117	33x4
Paige 6-55	3½x5½	Remy	Remy	Ray	127	34x4½
Paterson 6-46	3¼x4½	Delco	Delco	Stm	120	33x4
Pierce-Arrow 48	4½x5½	Delco	West	Own	142	35x5
Pierce-Arrow 38	4x5½	Delco	West	Own	134	34x4½
Pilot 6-45	3¼x5	Delco	Delco	Till	120	32x4
Premier 6-C	3¾x5½	Delco	Delco	John	126	32x4½
Reo 1920	3 9/16x5	N-E	N-E	John	120	33x4
Roamer C-6-54	3½x5½	Bosch	BiJur	Stm	128	32x4
Saxon Y-18	2¾x4½	Remy	Wag	Stm	112	32x3½
Sayers 6-42	3¼x4½	Delco	Delco	Zeni	118	32x4
Scripps-Booth 6-39	2 13/16x4¾	Remy	Remy	Mar	112	32x4
Singer 19	4x5½	Bosch	West	Ray	138	33x5

(Continued on Next Page.)

Automobile Notes

NEW COMMONWEALTH.

In the 1920 model touring car of the Commonwealth Motors Co. the wheelbase has been increased from 115 inches to 117, permitting the fitting of a body having three inches additional room at the rear end. The frame is Parish & Bingham, of drop rear end type and five-inch channel section, and the rear springs are underslung. The full-floating axle is retained, but final drive is now of spiral bevel type. The engine is a 3½x5 Lycoming. The price is \$1395, with wire wheels fitted at an extra cost of \$125.

NEW OAKLAND.

The Oakland Motor Car Co., Pontiac, Mich., has introduced a four-door sedan as its latest body type for the standard chassis. A four-passenger coupe is also offered. Unnecessary weight has been eliminated in the new Oakland. The sedan is priced at \$1740 f. o. b. at the factory.

WILLYS-OVERLAND PRICES.

Prices have been fixed on the Overland Four and the Willys-Knight as follows:

Overland Four—Touring, \$845; roadster, \$845; sedan, \$1375; coupe, \$1225.

Willys-Knight—Touring, \$1750; roadster, \$1750; sedan, \$2550; coupe, \$2500.

WHITE TO MAKE CAR.

D. McCall White will manufacture his proposed car at Indianapolis. It is said that White is backed by the Nash interests. The cars will sell for \$4500 or \$5000. Ten thousand cars are scheduled for the first year's production.

HOFFMAN TO MAKE CAR.

A new six-cylinder car will be marketed by the Hoffman Bros. Motor Co., Elkhart, Ind., early next year. A \$200,000 addition is being built to the company's motor truck plant. The schedule calls for 10 cars daily.

PLANS FOR PACKARD.

The Packard Motor Car Co. announces that it does not expect to produce a six-cylinder car for months, if not years. There is no intention of discontinuing the twin-six machine.

ADOPT PREST-O-LITE.

Chandler, Grant and King will have the Prest-O-Lite storage battery, type 613 R. H. N., for standard lighting and starting equipment.

MITCHELL BUILDS CLOSED BODIES.

The Mitchell Motors Co., Inc., Racine, Wis., is now building its own closed bodies for Mitchell cars.

Automobile Notes

HUPMOBILE REFINEMENTS.

The Hupp Motor Car Corporation has introduced into the production of its present model, the series R, a number of minor refinements in body and chassis design and construction. Announcement of such recent improvements was made coincident with the increase in price of its touring and roadster models to \$1450, and the placing of a \$2185 price on the sedan and coupe.

An improved design steering gear of more substantial construction has been adopted, insuring maximum efficiency from this important feature. Slight alterations have been made in front springs, increasing their usefulness and durability. A rearrangement of the exhaust and intake manifolds insures quick preheating of fuel, and consequent increase in efficiency. A new design front axle, of stronger construction, is being used, with Gurney ball bearings. Changes have been made in material and design of the driving pinion and ring gear. The Alemite type grease cup has been generally adopted for spring shackles, spindle bolts, etc. In this system the grease is forced by a grease gun pressure of some 200 pounds to those parts requiring lubrication. Grease can be forced through the spring bolts and to other spots so quickly that the entire car may be greased in 12 minutes. The elimination of possible body rattles or squeaks has been aided by changes in construction of the body cowl. An improved type windshield, in addition to being nearer rain proof, is also noiseless. The headlight support and brackets are arranged so as to permit quick adjustment sideways or up and down. The lamp bulb may easily be focussed by an outside adjustment. Night driving is made more pleasant and safer by the ease of these adjustments. Comfort has been increased by the addition of one inch to the depth of the front seat cushion, and two inches to the height of the back of the front seat. The increase in the height of the cowl and larger size radiator add to the charm of the car's beauty. Rear fenders have been redesigned and contribute their quota of good looks.

These chassis are general on all models. Particularly in the sedan and coupe have the latest tendencies in body design found expression. The upholstery is deeper, of even better grade cloth than in the past. The Hupp Motor Car Corporation offers four body types, the standard touring car, a roadster, a coupe and a sedan, all being mounted on the same chassis.

NEW COLE MODELS.

The Tourosine, the Tour-sedan and the Sportosine are the latest offerings of the Cole Motor Car Co., Indianapolis. All three models sell at \$3995. All of the Cole all-season models are furnished in aero-gray or American flag blue, with mohair velvet upholstery to match. In

PASSENGER CAR SPECIFICATIONS

(Continued from Preceding Page.)

Name and Model	Engine	Ignition	Starting Lighting	Car.	WB.	Tires
Stephens	3 1/4 x 4 1/2	A-L	A-L	Till	122	32x4
Studebaker EH-6-50	3 1/2 x 5	Remy	Wag	Ball	119	32x4
Studebaker E-G-6	3 1/2 x 5	Remy	Wag	Ball	126	33x4 1/2
Vellie 48	3 1/4 x 4 1/2	A-K	Bijur	Ray	115	32x4
Westcott A-48	3 1/2 x 5 1/4	Delco	Delco	Ray	125	32x4 1/2
Westcott A-38	3 1/4 x 4 1/2	Delco	Delco	Ray	118	33x4
Winton 24	4 1/2 x 5 1/2	Bosch	Bijur	Stm	138	35x5
Winton 25	3 3/4 x 5 1/4	Bosch	Bijur	Stm	132	35x5
EIGHT-CYLINDER MODELS.						
Apperson 8-20	3 1/2 x 5	Remy	Bijur	John	130	(34x4 1/2) (33x4)
Apperson Anniversary	3 1/2 x 5	Remy	Bijur	John	130	(32x4) (34x4 1/2)
Cadillac 57	3 1/2 x 5 1/2	Delco	Delco	Own	(125) (132)	35x5
Cleveland D	3 3/4 x 4	Remy	A-L	Stm	120	34x4
Cole 870	3 1/2 x 4 1/2	Delco	Delco	Stm	127	33x5
Cunningham V-3	3 3/4 x 5	Delco	West	Stm	132	35x5
Daniels B	3 1/2 x 5	West	West	Zeni	127	34x4 1/2
King G	3x5	A-K	Bijur	Ball	120	34x4
Murray	3 1/2 x 5	Dixie	West	Zeni	128	34x4 1/2
Oldsmobile 45-B	2 3/4 x 4 1/2	Delco	Delco	Ball	120	34x4 1/2
Peerless 56	3 1/2 x 5	A-K	A-L	Ball	125	34x4 1/2
Standard H	3 1/2 x 5	Dixie	West	Zeni	127	34x4 1/2
12-CYLINDER MODELS.						
Haynes	2 3/4 x 5	Delco	L-N	Ray	127	34x4 1/2
National	2 3/4 x 4 1/2	Delco	Bijur	Ray	128	34x4 1/2
Packard 3-25	3x5	Delco	Bijur	Own	128	35x5

Abbreviations: Ignition and starting and lighting—A-K, Atwater Kent; A-L, Auto-Lite; Ber, Berling; Conn, Connecticut; Dyn, Dyneto; Els, Elsemann; G & D, Gray & Davis; L-N, Leece-Neville; N-E, North East; Split, Splitdorf; Wag, Wagner; West, Westinghouse; W-L, Ward Leonard; carburetors—Ball, Ball & Ball; Cart, Carter; Holl, Holley; John, Johnson; Mar, Marvel; Mill, Miller; New, Newcomb; Ray, Rayfield; Sch, Schebler; Stew, Stewart; Stm, Stromberg; Till, Tillotson; Zeni, Zenith.

the Sportosine a glass partition between the front and rear compartments, operated by an automatic regulator, makes the car instantly convertible into a sedan or a limousine. The tonneau has a seating capacity of four passengers, the rear seat accommodating two, and there are two cab seats which fold into the back of the solid front seat. Using the driver's compartment, by lowering the glass partition, the car will accommodate six. The Tourosine is a seven-passenger vehicle and also can be converted into a limousine or sedan. The Tour-sedan has a seating capacity for seven.

NEW MOON SEDAN.

While the chassis details of the new Moon 6-66 sedan are very similar to the Moon Victory model introduced last spring, the wheelbase is 125 inches, having been made longer to account for the additional weight and to provide better riding qualities. As the complete sedan weighs 3250 pounds, the tires used are larger, being 35x4 1/2. The sedan, for seven passengers, is sold by the Moon Motor Car Co. for \$3750 f. o. b. at the factory at St. Louis, Mo.

NEW MODELS FOR COLUMBIA.

The Columbia Motors Co., Detroit, will add two new models to its line soon, a two-passenger open roadster and a four-passenger coupe.

NEW OGREN CAR.

The Ogren Motor Car Co., Milwaukee, a new \$500,000 corporation, plans to get the Ogren car into production next month.

CARS IN NEW YORK STATE.

While there has been more or less speculation among automobile manufacturers, dealers and motorists generally, as to just what New York state was doing this year in the way of increasing its motor vehicles, figures announced for the first time by Secretary of State Francis M. Hugo, and covering the first six months registration, reveal a growth that is little short of marvelous. Compared with Aug. 1, 1918, New York state during the last six months has added over 68,000 motor vehicles, the ranks of its chauffeurs have grown by over 21,000, its commercial cars have increased over 13,000, but its motorcycles have decreased by over 4700.

On Aug. 1, 1919, New York state had a total motor vehicle registration of no less than 504,771 cars. As the number of cars and chauffeurs has increased in the six months period, the receipts to Mr. Hugo's office show a corresponding upward trend, running into the hundreds of thousands. In the first six months of 1918 the State Automobile Bureau took in \$4,621,015.

NEW CADILLAC LARGER.

The new series Cadillac cars, it is reported, will be lengthened out and made larger, as compared with the present product, and there will be a material increase in price.

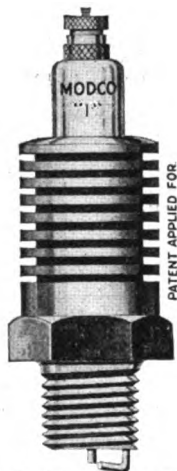
EIGHT CYLINDERS FOR FORDS.

It is reported that the Ford Motor Co. is working on the addition of four more cylinders to its car in the development of an eight-cylinder model.

ACCESSORIES DEPARTMENT

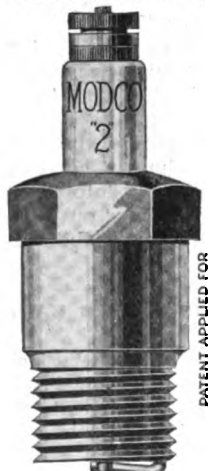
"Modco" Spark Plugs. "Modco" Spark Plugs differ from standard type plugs in their construction. The No. 1 plug is made in two parts, so the porcelain is as far as possible from the intense heat of the engine.

The grooves around the shoulder of the porcelain keep it at lower temperatures



and insure it to be cooling gradually. The spark points are high grade material tested to a melting point of approximately 2900 degrees Fahrenheit. The porcelains are renewable by unscrewing the two parts.

The manufacturer claims to have created a large demand for the plugs from automobile, truck and tractor engine manufacturers. No. 2 plug is a smaller plug than No. 1. The shell of this plug is made

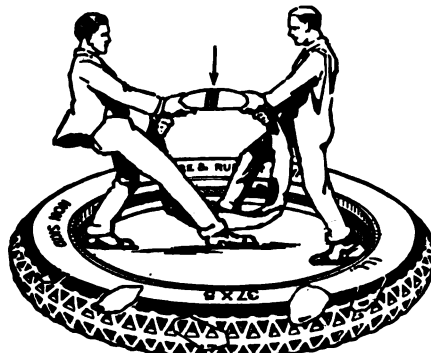


of one inch stock, has a body that can be used in any make of engine.

Manufactured by the Modern Comb and Device Co., Dayton, O. Special prices to the trade upon request.

Superfix Rubber Repair. Superfix Rubber Repair is a cement-like substance con-

tained in a can having an air tight cover. It may be safely carried in a tool box for use on the road or may be used by tire and tube repairers in shops. It is claimed by the manufacturer that it will mend punctures or blowouts. The work can be done by vulcanizing and after the repair is finished it will be equally as



strong as a repair made with a vulcanizer. It is claimed that neither tools, heat, acid or skill is required to use Superfix successfully and that friction, heat or cold does not affect it. The time required to use Superfix is from five to 20 minutes, according to the size of the tear or puncture, and a tube can be ready immediately for the road in the case of a small puncture and may be inflated at once.

Manufactured by the Superfix Rubber Co., Elyria, O. Price, \$1 per can.

Dixon's Graphite Non-Leak Grease No. 680 and Gear Oil No. 675. Dixon's Non-Leak Grease No. 680 is prepared for use in differentials, and by its use the manufacturer claims that troubles such as grease working out around the hub bands and the brakes are prevented. The consistency of this grease is rather heavy and it should only be used in extreme cases where lighter greases or oils will not serve successfully. It cannot, however, be used in transmissions.

Gear Oil No. 675 is a very light bodied gear lubricant for use in transmission and differential cases designed for light oil lubrication. Generally speaking, it

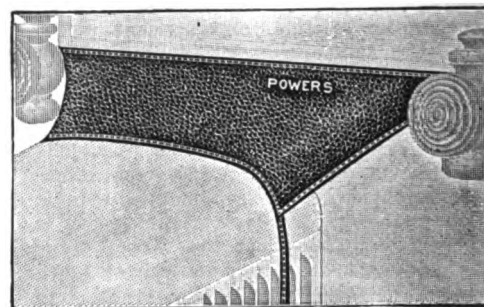


should be used only in cases fitted with plain bearings. The manufacturer especially recommends this oil for worm drive trucks as it readily follows the gears and has unusual lasting qualities and will keep cool under heavy loads.

Manufactured and sold by the Joseph Dixon Crucible Co., Jersey City, N. J. Prices on application.

(When Writing to Advertisers, Please Mention the Automobile Journal.)

"Powers" Coil Protector for Ford Cars. The "Powers" Coil Protector for Ford cars consists of a suitable covering for the dash, fastened at the bottom of the windshield, by loosening the two screws, slipping the protector in place and tight-



ening the screws. The manufacturer claims that this shield will absolutely protect the coils and wiring in the event of rain. Once in place the protector remains a permanent fixture that adds to the appearance of the car.

Manufactured by the Powers Manufacturing Co., Waterloo, Ia. Price, 32-ounce rubber drill, \$1.50; 28-ounce enamel drill, \$1.25.

The Victor Gasket Assortment for Ford Engines. The Victor Gasket Assortment for Ford engines is put up in a neat show case carton, containing cylinder head gaskets, cylinder head outlet gaskets, cylinder head inlet gaskets, carburetor flange gaskets, inlet and exhaust pipe gaskets and transmission drain plug gaskets.

The Victor boxed gasket assortments for Ford cars have been sold on the market for several years and thoroughly meet



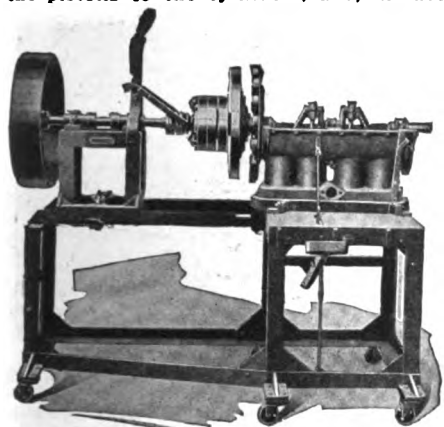
the requirements of dealers and garage repairers. The manufacturer claims these gaskets have become universally adopted.

The gaskets are fully guaranteed against all defects and imperfections. None are genuine unless stamped with the Victor trade mark, which insures their superiority and guarantees perfect fit for all models of Ford cars.

Manufactured by the Victor Manufacturing and Gasket Co., Troy and 21st Sts., Chicago, Ill. Prices and literature on application.

The F. & M. Burning-In Stand consists of a combination burning-in stand, engine work bench and differential stand all in one unit. By its use in a service station or garage much valuable time may be saved, the manufacturer claims. The stand is mounted on rollers so that it may be wheeled easily to any part of the shop when loaded, and when empty is light enough to be carried by two workmen. It is made from angle iron bolted and riveted and well braced so that it is unusually strong. It may be placed in front of the car when an engine is to be removed, the engine placed upon it and fastened, the stand and engine moved to the work bench, connected to the power and the bearings burned-in.

In work of this nature the stand is rigidly held to the floor by a special fastening, as is also the engine to the stand. Such work as testing the magneto, fitting the pistons to the cylinders, and, in fact,

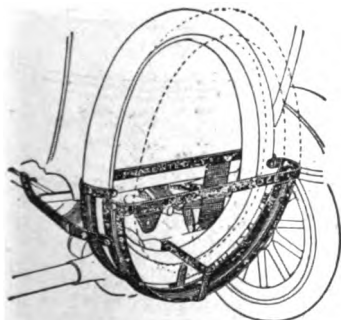


all kinds of work necessary in connection with the engine, may be done while the engine is on the stand.

For differential repairs, special brackets are provided that are placed at one end of the stand, including a drip pan for the oil, allowing the repairs to be done quickly and easily without the repairer having to move from standing position. The manufacturer claims that the stand is a time and labor saver, and that by its use more and better work may be turned out in a given time than by any other method.

Manufactured by the Hastings Manufacturing Co., Hastings, Neb. Prices and literature on application.

The New Era Cradle Carrier for Ford Cars consists of a steel frame easily attached to the running board of the car or at the rear, and will accommodate one or two tires. It is made throughout of pressed steel, having a 3 1/4-inch cross sec-

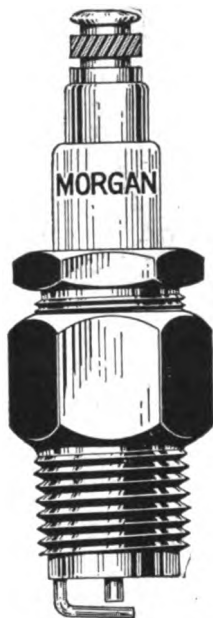


tion rolled to snugly fit the tread of the tire. It fits 30 by 3 1/4-inch tires, plain or non-skid, and is suitable for tires mounted on demountable rims or casings only. The carrier is made either single or double. The rear carrier also provides for the attaching of the number and light bracket and is provided with a suitable cross bar suitable for locking the tire.

Manufactured by the New Era Spring and Specialty Co., Grand Rapids, Mich. Prices, No. 204, single, side, \$4.20; No. 327, double, side, \$6.30; No. 326, double, rear, \$7.35; No. 207, single, rear, \$5.25.

The Morgan Spark Plug for Passenger Cars is designed to meet the demand for a plug that has the desirable features, but not the faults common in spark plug construction. All shells and bushings are made from the best grades of cold drawn steel, machined and rigidly inspected many times during manufacture. The Morganstone insulator is of a special grade of porcelain.

Electrodes are of the best grades of special heat resisting wire. The ground electrode, the maker states, is clinched into the shell from the inside in a manner that prevents motion, while the center electrode is firmly affixed in the insulator. The cap is attached to the insulator so as to be inseparable and forms a perfect

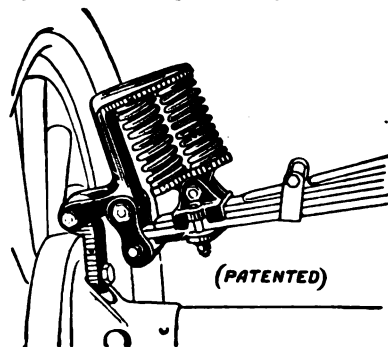


circuit with the center electrode. The terminals are closely threaded to fit the caps and the caps are easily placed with the fingers.

Manufactured by the Morgan Manufacturing Co., Inc., Keene, N. H. Price, "Standard" type, 75 cents; "400" type for passenger cars, \$1; "500" type for trucks and tractors where a heavy duty plug is required, \$1.25.

Champion Shock Absorbers for Ford Cars. Champion Shock Absorbers are a twin spring type and the manufacturer claims that by making use of eight coil springs instead of four he has prevented rebound, and that with this equipment a car rides as easily as a vehicle costing several times the price.

The Champion absorber is attached very easily and with practically no altera-

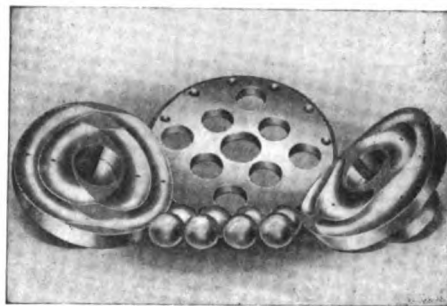


tions. Extra tools are not required for installing. The absorber is attached to the ends of the spring in the usual manner. A 10 days' trial is allowed and if not satisfactory the absorbers may be returned and the money will be refunded.

Manufactured by the Champion Shock Absorber Sales Co., Inc., Indianapolis, Ind. Prices and literature on application.

The Dorr Miller Differential for Fords and Chevrolet 490 Types is simple in design and construction. The danger of skidding is reduced because both wheels are locked when driving over slippery roads and the same amount of power is supplied to each wheel. In rounding corners the same effect is gained as when the regular differential is used.

The unit consists of a center disc having nine holes drilled in the face, into which are inserted nine steel balls. Fitting against this disc at each side is a grooved disc or camblock having an enlarged hub with key way for receiving the axle and key. The three discs and the balls are fastened together by retaining collars or casings and a flange for attaching the



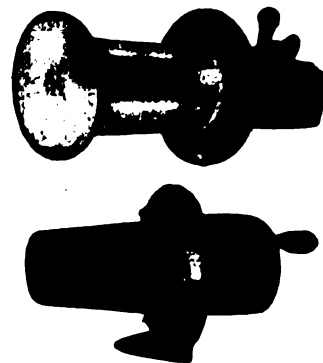
large bevel gear, making a unit that may be inserted in the housing of a Ford or Chevrolet 490 car with little labor.

The maker claims that the unit eliminates the necessity of differential replacements, that it is practically waterproof and also that greater tire mileage is possible as the wheels do not spin on slippery roads.

Manufactured by the Dorr Miller Differential Co., 90 West Street, New York, and Gas Building, Chicago; factory, Detroit. Price of unit, ready to install, \$20 f. o. b. Detroit.

The Talking Horn is similar to the ordinary hand-operated horn, and is attached to the side of the car near the hand of the operator. Besides giving a clear warning sound, it may be manipulated so that its sounds will correspond somewhat to the human voice.

The company has added two new models to this line and they are known as the Torpedo No. 6 and the Leader No. 7. No. 6 may be placed on the side, at the steering post or under the hood. It is operated



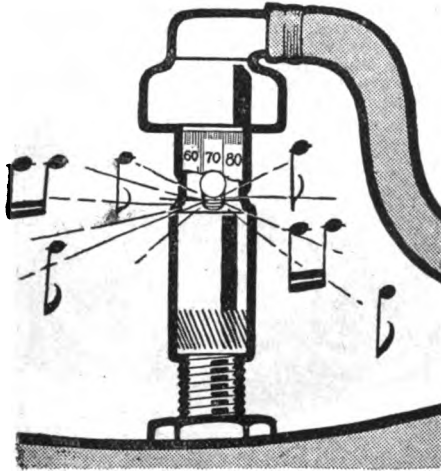
by a strap and by using additional cord it may be blown by the occupants of the rear seat. It is equipped with suitable bracket according to its location.

No. 7 is made of solid brass, nickel plated or black enamel, and is also equipped with a universal bracket to fit any model car. A larger ratchet is used, having more teeth in the gears so that 420 strikes at the central diaphragm button are had at a single turn of the crank. The horn is 12 inches in length and the manufacturer claims that it is possible to make it heard for a distance of a mile.

Manufactured by the Talking Horn Co., Middletown, N. Y. Price, \$15.

(When Writing to Advertisers, Please Mention the Automobile Journal.)

The Automatic Pressure Regulator for Tire Inflation resembles the ordinary tire gauge. The movable collar around the top, with which it is set for any desired pressure, controls a ball and spring valve that will not allow the admittance of air after the desired pressure has been reached. The excess air escapes through the port at the side, emitting a whistling sound, giving audible evidence that the

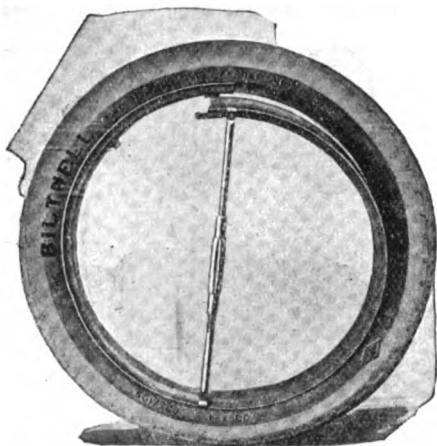


pressure is right. The maker states that after the regulator is once attached and set it needs no further attention. The hose connection is made in the usual manner.

The manufacturer claims that by using the pressure regulator many of the tire troubles so common may be eliminated, resulting in fewer blowouts, greater mileage per gallon of gas, longer tire life and lower repair bills.

Manufactured by the Automatic Safety Tire Valve Corporation, 1765 Broadway, New York. Prices and literature on application.

The Universal Split-Rim Contractor and Expander is manufactured for the use of passenger car owners and tire repairers. The manufacturer claims that with its aid it is possible to remove the most stubborn tire. The tool is in three sections and is carried in a neat roll in the tool



box. It consists of two rods, having one end of each threaded, the opposite end formed in the shape of a hook for inserting over the edge of the rim at opposite points.

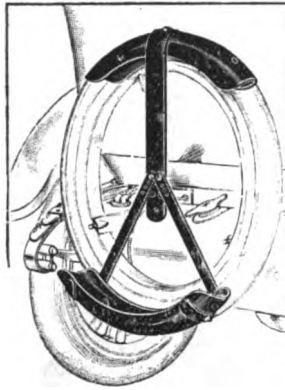
A center section is screwed onto the threaded ends of the rods and acts as a turn buckle, drawing the two ends toward the center of the rim. This action causes the rim to be separated at the split portion, allowing the tire to be easily removed from the rim.

Manufactured by the Moss-Ochs Co., 2801 Manor Avenue, Cleveland, O. Price, \$2.

(When Writing to Advertisers, Please Mention the Automobile Journal.)

2-R-3 Tire Carriers for Fords and Other Passenger Cars are manufactured from the best of material throughout and by their method of construction and suspension enable the motorist to carry a number of extra shoes. These carriers may be fastened at the rear of the car or placed upon the running board, and will hold one, two or three tires. The construction of the carriers is such that they may be disassembled and packed away in a comparatively small space.

The cradle sections fit about one-quarter of the circumference of the tires, and the carriers are adjustable for wider tires by



means of a suspension bar provided with a series of holes to receive the two narrow bars, thus allowing adjustment for any size tire. The carriers fit any car, the manufacturer claims, and provision is made for the carrying of one extra tire.

Manufactured by the International Stamping Co., 400-412 N. Leavitt Street, Chicago, Ill. Prices, model S, from \$2 to \$3.50; model Y, from \$3.50 to \$6. License brackets and tail lights extra. Running board side carriers for car or truck, from \$4.50 to \$8. Tire carriers and spring bumpers from \$6.50 to \$17.50.

Tipco Spark Plugs differ from the usual spark plug construction in that two porcelain shells are employed instead of one. The manufacturer explains that since the introduction of the internal combustion engine spark plug manufacturers have been working and experimenting in an effort to find a porcelain that would withstand two temperatures under pressure. It is claimed that the Tipco Spark Plug meets the two different temperatures with two different porcelains.

The shell of the plug is the regular threaded type made of steel. A threaded bushing screws into the top of the shell, having a porcelain insulator cemented to

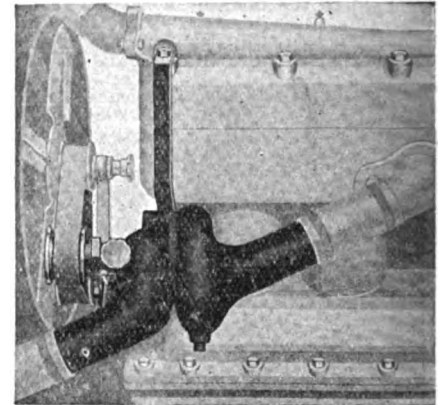


its inner surface with the electrode passing through its center. Over this porcelain fits a porcelain shell, held in place by a set nut at the top of the porcelain and threaded to the center electrode. Provision is made for an air space between the upper and lower porcelains so that the temperature of the lower will not affect that of the upper.

Manufactured by the Ignition Plug Co., 1411 West Broadway, Louisville, Ky. Prices and literature on application.

The Fond Du Lac Circulating Pump for Ford Cars consists of a centrifugal water pump fastened by suitable brace iron to the top of the engine and the front of the base, rigidly supporting it at the side and in line with the hose passing from the radiator at the bottom to the water jacket intake at the side of the engine. It is driven by the fan belt from the crankshaft pulley, insuring, the maker claims, a positive and even circulation of the water while the engine is in operation.

The manufacturer states that the pump is constructed of the best of semi-steel and bronze, perfectly machined, and is fool proof. The parts are made to a templet and are interchangeable. The



pump is made specially for engines using kerosene, gasoline or tops. It is also constructed for use on stationary or portable engines, but made principally for the Ford engine. It is easily installed in a few moments time by any one handy with tools, as it is not necessary to bore holes for its installation. It weighs eight pounds.

Manufactured by the Fond Du Lac Tractor Corporation, Fond Du Lac, Wis. Prices and literature on application.

The O-So-Easy Hand Cleanser for the Motorist, the maker states, is made from a pure vegetable oil base, combined with products of the highest quality, and is for the use of the motorist after working about the car. The manufacturer claims that it will remove dirt, oil and grime without burning or scratching the skin or injuring it in any way, and that O-So-Easy contains no injurious chemicals that



clean by corroding action, but cleans because it is a soap.

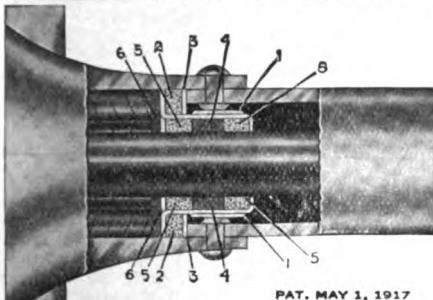
It is also a cleanser for enamel ware, bath tubs, porcelain sinks, paint, floors and silver.

Other articles made by this company include nickel polish, a mohair top dressing, a brass polish, a leather top dressing, a cushion dressing, a tire paint and an automobile soap. All articles are guaranteed.

Manufactured by the Boston Blacking Co., East Cambridge, Mass. Prices to the jobbing trade on application.

Shurnuff Grease Retainers for Ford Cars. Shurnuff Grease Retainers for Ford cars consist of three extra high grade felt washers, one rubber asbestos washer, a cold drawn steel cup and two retaining rings, placed in the differential housing at the end of the Hyatt roller bearings. By this method of placing the washers the manufacturer claims that the leaking of the grease from the differential housing

Shurnuff GREASE RETAINER



1. Steel Cup. 2. Large Felt Washer. 3. Large Steel Retaining Ring. 4. Asbestos Washer. 5. Small Felt Washers. 6. Small Steel Retaining Ring.

to the brake drums is prevented. The grease retainer is stationary and is held in place by the two rivets of the axle housing. The method of installing is very simple and directions are included with each pair.

For counter display by jobbers the retainers are packed six or 12 dozen pair in a carton.

Manufactured by the Shurnuff Manufacturing Co., 3147 Locust St., St. Louis, Mo. Price, 90 cents a pair.

Tubo Puncture Sealer. Tubo Puncture Sealer is a liquid that is to be placed in the tubes of tires and the manufacturer claims that by its use leaks in tubes are vulcanized as thoroughly as if with an outside source. Tubo Puncture Sealer is made by treating the finest and strongest mineral fiber with other materials that



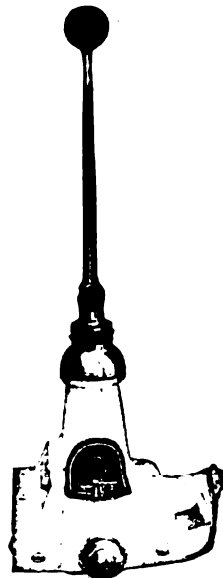
will seal punctures from the most minute size, even those that cannot be detected by immersion in a tub of water, to those of larger size, according to the rigidity of the casing. It is also claimed that it contains mineral preservatives of rubber and fabric which maintain the rubber of tubes in the same condition as when applied.

Manufactured by the Tubo Manufacturing Co., 611 N. Vandeventer Avenue, St. Louis, Mo. Price \$5 per package, which makes three quarts of liquid.

The Johnson Automobile Lock for Pleasure Cars. The Johnson Automobile Lock is primarily a gear lock for pleasure cars having sliding gear shifts, consists of a locking lever that is substituted for and is exactly the same shape as the shifting lever originally used. It has but one moving part, the steel plunger that rides up and down on the lower portion of the shifting lever, within the transmission case.

When the car is to be locked a turn of a Yale key forces this steel plunger downward between the gear shifting forks. The locking device is entirely concealed. To steal a car equipped with a Johnson lock the thief must remove the transmission cover and substitute another shifter lever, is the claim of the manufacturer.

The lever, including the lock, is constructed from best grade open-hearth steel, drop forged and finished in nickel. Breaking the lever or any part of the locking device is impossible. Each lock



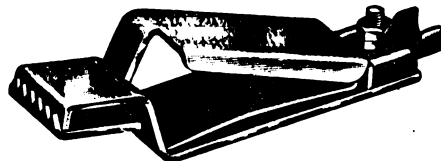
is carefully tested before shipment, and is sold with a broad guarantee.

The lock is installed by removing the shifting lever and replacing it with the Johnson lever, which is then locked in the transmission case. The entire locking device is a permanent part of the car, and the use of an electric drill and other shop equipment is necessary before it can be removed.

From a mechanical standpoint the manufacturer claims the locks are absolutely "trouble proof," and the roughest handling cannot in any way effect their utility.

Sold by the Edwards Sales Co., St. Louis, Mo. Prices and literature on application.

The No. 11-A Universal Battery Clip is made of copper, lead coated. The manufacturer claims that this clip is capable of carrying 100 amperes for a full day without getting too hot to handle, and may be used for short tests up to 200 or



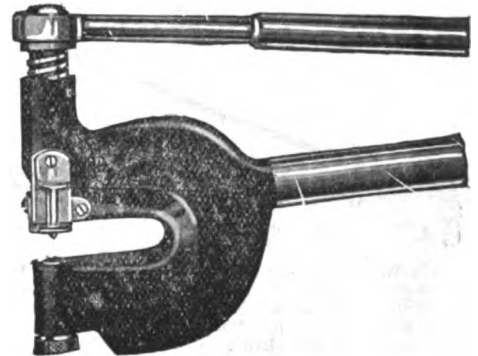
300 amperes and is therefore suitable for use in making the so-called "battery discharge test."

The clip has a jaw opening of one inch and a cleat at the rear, by means of which a comparatively heavy cable may be attached.

Manufactured by R. S. Mueller & Co., 423-425 High Ave., Cleveland, O. Prices on application.

"Jiffy" Speed Punch for the Tool Kit or Shop. The "Jiffy" Speed Punch is of powerful, compact type for punching holes in sheet metal up to 10 gauge thickness. It weighs five pounds and is 9 1/4 inches long. It works in small space and will punch holes as follows: 5-32, 3-16, 7-32, 9-32 and 1/4 inch, requires little oiling and no adjusting.

The punch is held and operated by hand,

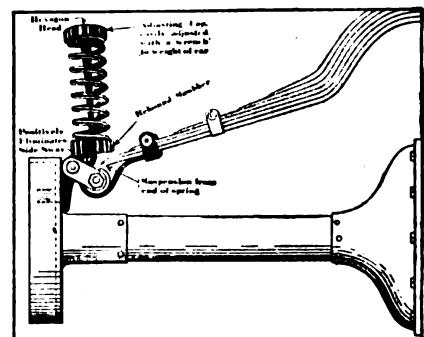


is very compact and is easily carried from job to job, or may be fastened in a vise. Punches are crowned, of the floating type, directing the power to the center. That the punch will not twist or turn while in operation and will not leave a burr on the metal after the hole is made is a claim of the manufacturer.

The Jiffy Punch, the manufacturer claims, will not tire the mechanic operating it, as the handles are short and the operator is close to the work. A half turn of the lever only is required to drive the punch through the metal. Punches and dies are easily changed from one size to the next. "Jiffy" Punches are fully guaranteed. Jiffy Speed Cutter for cutting holes in metal is also manufactured.

Manufactured by Paul W. Koch & Co., 19 South Wells St., Chicago, Ill. Price, \$15. Punches, 5-32, 3-16, 7-32, 1/4 inch, each, 35 cents; dies, 5-32, 3-16, 7-32 and 1/4 inch, each, 35 cents. One punch and die furnished with each tool. Specify size wanted, otherwise 3-16 inch will be sent.

The Lansfield Shock Absorbers for Ford Cars are of a coiled spring type, mounted on special spring perches that replace the Ford perches. The absorber springs are seated on the perches and guide rods, clipped to the spring ends, pass through the spring shackles and extend upward

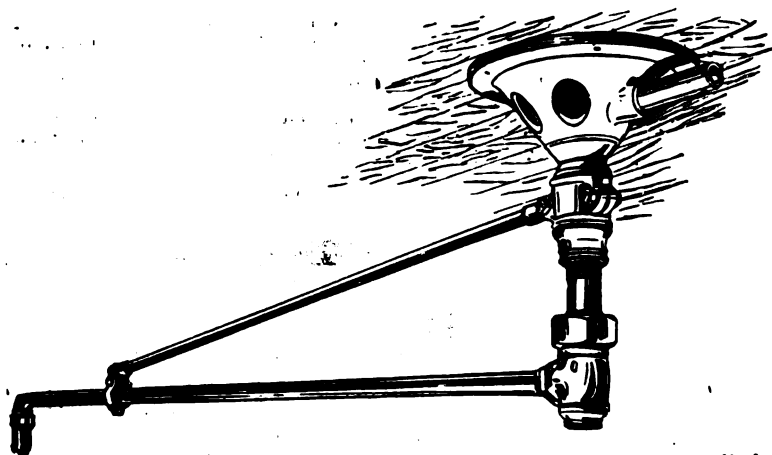


through the springs, the upper ends passing through caps secured with nuts.

The deflection of the main spring is taken by the seats in the spring perches, and claim is made that the reflection is absorbed by the coiled springs, the tension of which is adjusted by the nuts that retain the caps on the guide rods. The absorber is easy to install as there are no holes to drill.

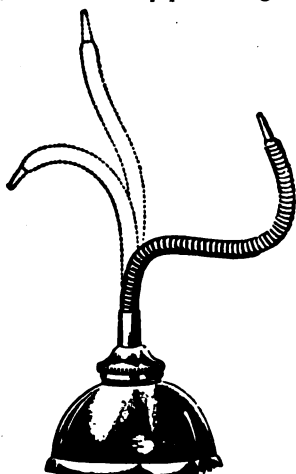
Manufactured by the Lansfield Manufacturing Co., 510 First Ave., West Haven, Conn. Price, per set of four, \$12.50. Unconditionally guaranteed that if customer is not satisfied the purchase price will be returned.

(When Writing to Advertisers, Please Mention the Automobile Journal.)



All-Way Oiler and the Deluxe Overhead Vehicle Washer. The All-Way Oiler is an oil can with a flexible steel spout that may be bent to any desired angle or position without breaking or obstructing the flow of oil. Simply bend the spout to the part to be oiled and use the can in the ordinary manner. The All-Way oiler is fitted with a device at the end of the spout with which it may be cleaned in a second. The same device prevents the oil flowing too freely, preventing waste. The All-Way Oiler is strongly made of copper-plated steel, in different sizes.

The DeLuxe Overhead Vehicle Washer is a fixture that can be fastened securely to the ceiling over a wash stand and has a movable arm that carries the water from the main inlet pipe through a suit-



is softer than the cylinder walls, better bearings will result than where conventional rings are used.

Each steel spring ring takes care of .025 wear, making it the equivalent of six ordinary rings (zero, .0025, .005, .010, .015 and .025), and greatly simplifying the stock problem for the dealer as well as giving greatly lengthened service to the customer.

Manufactured by the Steel Spring Plaston Ring Co., 2 Columbus Circle, New York City. Guaranteed absolute satisfaction or money returned. Prices and literature on application.

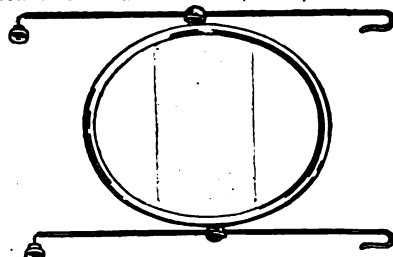
"Fracto" for Preventing Headlight Glare. Fracto units are constructed of glass and are attached to headlight bulbs at the rear, fit around the lower half of the bulbs. The side of the Fracto next to the bulb is plain glass, while the opposite side is a ribbed formation that will diffuse the light rays back and into the lamp reflector.



The manufacturer claims that when a bulb has been properly focused and a Fracto is installed the light rays pass through the Fracto as through a prism and are directed down and onto the road so that the light of the head lamp meets the requirements of the law.

Manufactured by the Fracto Specialty Co., 161 Massachusetts Ave., Boston, Mass. Prices on application.

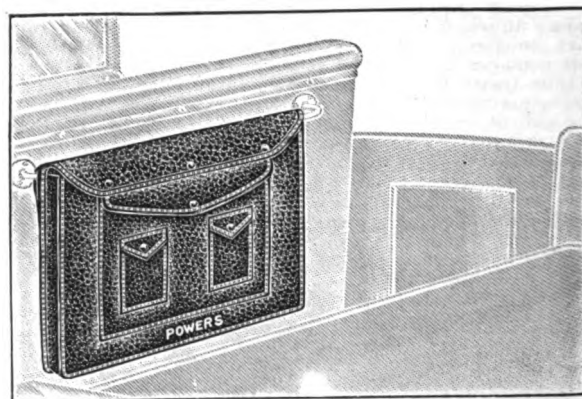
Auto Antiglare. The Auto Antiglare is a device of glass and metal that is made to fit any windshield. It fits over the top of the shield and may be placed in any position desirable. When in use its logical position is in front of the driver and when not required it may be pushed one



side. All metal parts are handsomely nickel plated and polished. Small vacuum cups hold the device firmly in place at the bottom and the glass may be raised or lowered to suit the convenience of the driver. May be used either on the right or left side as desired.

Manufactured by the Portland Sales Co., 15 Chardon Street, Boston, Mass. Price, \$2.

(When Writing to Advertisers, Please Mention the Automobile Journal.)



"Powers" Robe Rail Pocket. The "Powers" Robe Rail Pocket is suspended from the robe rail of a car and serves for storage for small articles, such as calling cards, driving glasses, ladies' veils, gloves, etc. The case is made of a good grade of artificial leather and is bound with the same material, double stitched. Equipped with snap buttons and extra pockets. Size, 18 by 24 inches, with three-inch gusset. Weight, 1 1/4 pounds.

Manufactured by the Powers Manufacturing Co., Waterloo, Ia. Price, \$6.

Twin Fire Spark Plug. Twin Fire Spark Plug electrodes are so made that a plug gives two positive sparks at the same instant. The center electrodes, through the porcelain insulator, is turned over in the usual manner. At the bottom of the insulator is an intermediate electrode or ring fitting the end of the porcelain. The point of the center electrode is separated from this intermediate electrode. The second or ground electrode is fastened to the shell of the plug and is separated from the intermediate electrode. When in operation the high-tension current passes down the center electrode to the bent



point at the end, jumps the gap to the intermediate electrode and is carried across to the opposite side, where it jumps again to the electrode leading to the shell of the plug and to the ground of the engine. In this manner the plug fires in series order and gives two positive sparks.

The manufacturer claims that soot, carbon or oil will not prevent the plug firing and if by chance carbon should collect on the points it would be blown off by the second set of points firing. The lead pencil test is given as proof of this statement.

Manufactured by the Twin Fire Spark Plug Co., Detroit, Mich. Made in 1/4, 3/8, 18 regular and 3/4 extension sizes and metric. Price, \$1 each in the United States. In Canada, \$1.25.

able connection in the swivel joint to end of arm, at which point hose is attached.

The device is made of the best materials and is guaranteed by the manufacturer. Claim is made by the manufacturer that the swivel joint is positively non-leakable.

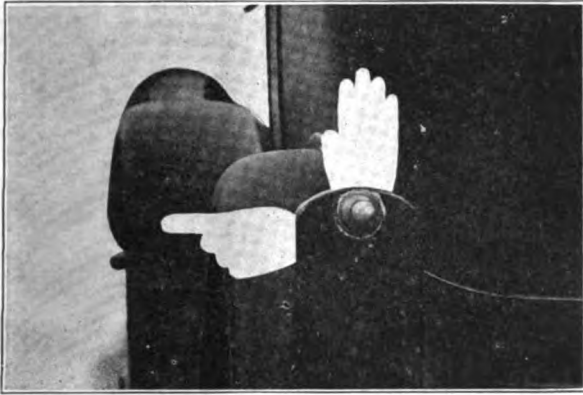
Manufactured by the Famasco Distributing Co., 694 Main St., Buffalo, N. Y. Prices and literature on application.

Steel Spring Piston Rings for Ford Engines. Steel Spring Piston Rings for Ford cars have steel spring inserts fitted under the rings in the grooves of the pistons. With this construction the manufacturer claims that a constant, even pressure is exerted on the rings which fit the cylinders tighter, insuring greater compression and preventing loss of compression.



In fitting the springs no filing is required and claim is made the 12 rings may be easily fitted in the piston grooves in 15 minutes. As the metal of the rings

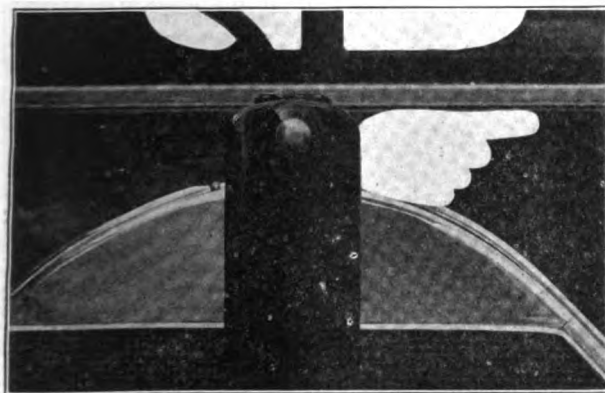
"Safdicator" Signal System. The "Safdicator" is a device for signaling, either at the front or rear of the car, or both. It consists of two boxes, one placed on the filler spout of the radiator, measuring $3\frac{1}{4}$ by $8\frac{1}{2}$ inches and containing two hands, indicating the direction, right or left, for the benefit of a traffic officer, an approaching car or pedestrian. The other box, measuring $4\frac{1}{2}$ by $8\frac{1}{2}$ inches, is mounted on the left rear fender or on a bracket on the left rear side and contains three hands. Two of the hands indicate the direction right and left and work simultan-



eously with those in the front box on the radiator filler spout, being operated by a push and pull switch placed conveniently on the steering column. The third or stop hand is connected to the foot brake, and is automatically operated by the slightest pressure upon the brake, warning any car behind of an intention to stop.

In each box is a light, connected to the tail light circuit, and when the tail lamp is lighted the circuit is on in the "Safdicator." The lamp of the "Safdicator," however, does not light until the hands are thrown to an indicating position, when they are illuminated. The boxes are aluminum, finished in black enamel and the hands are aluminum, enameled white.

The hands are mounted on ball bearings and all lever connections are hardened roller bearings. The current consumption, the manufacturer claims, is less



than that required for a side or tail light, as the device is only in operation while the engine is running.

A branch block mounted on the engine side of the dash handles all the wires necessary for the operation of the signal, and this branch block is amply equipped with the necessary fuses. Each of the hands, as well as the battery wires, are fused, and in case of trouble may be easily traced.

Manufactured by the Universal Safety Corporation, 624-28 East Cerro Gordo St., Decatur, Ill. Prices and literature on application.

Pronto Spark Plugs. Pronto Spark Plugs are made to a new principle for spark plug construction, the plug having an intensifier unit. The Pronto plug consists of a one-piece shell or bushing with the center electrode surrounded by a mica insulator, the mica being wound laterally instead of in sections. The intensifier is placed at the top of the electrode and is a part of the plug. It is claimed by the manufacturer that Pronto plugs and intensifiers are practically trouble proof and in the event of ignition failure the driver may forget the plugs and look for the



cause elsewhere. With the intensifier the driver can note whether the plugs are firing without removing them from the cylinders. The plugs are from the best materials, in sizes and types for all cars, trucks and tractors.

Manufactured by the Pronto Manufacturing and Sales Co., 706 South 24th street, Omaha, Neb. Price, \$1.50 each; tractor size, \$2.

Shurnuff Spark Plug. The Shurnuff Spark Plug differs from other types of plugs in that an air inlet is provided at the side of the plug, for the admission of air on the downward stroke of the piston,



supplying oxygen to the mixture. The manufacturer claims that this added air will lessen fouling of the plugs, increase mileage, develop power and decrease carbon. It is claimed that the air passing into the plug breaks a gas pocket which forms above the firing points, as it is the free oil in the unburned mixture that accumulates on the insulator, attracts free

particles of carbon and causes other type plugs to foul. On the return stroke of the piston the flow of air is automatically shut off by a ball check at the inlet, which insures full compression.

Manufactured by the Shurnuff Manufacturing Co., 3147 Locust St., St. Louis, Mo., Dept. J. List price, \$1.50 each.

Weaver Auto Oiler. The Weaver Auto Oiler consists of a self-measuring container having a handle for carrying and a spout for delivering the oil. With it the service station repairer can supply oil to motorists without waste and accurately



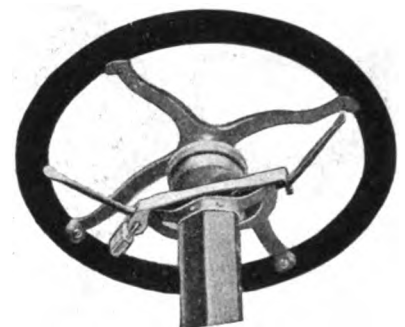
measure the oil placed in an engine oil reservoir.

The spout is heavy brass and is adjustable to deliver oil at any angle. The oil is released from the container by a button located conveniently to the thumb of the operator. A slight pressure releases the oil and removing the pressure shuts off the flow, the spout automatically draining itself.

The volume discharged is accurately shown by a direct float gauge operating within a graduated brass tube. The height of the tube is adjustable and the figures may be read from either side. The Weaver auto oiler is constructed from heavy galvanized iron and has a capacity of two gallons. Shipping weight, 10 pounds.

Manufactured by the Weaver Manufacturing Co., Springfield, Ill. Price, f. o. b., \$8.

Hart's Ford Locking Device. Hart's Locking Device for Ford cars consists of a heavy cold rolled steel bar that is attached to the spark and throttle levers and fastened by a padlock. An opening at one end of the bar is slipped over the spark lever and in the forked end holes are drilled,



through which a padlock is locked. The manufacturer claims that should a thief try to cut a bar and steal a car he would be sure to attract attention.

The device is heavily nickel plated. They are packed in attractive boxes (containing 24 separate locks in separate cartons) for counter display. Padlocks are supplied by the manufacturer when desired, the price depending upon the quality of the lock.

Manufactured by Hart & Co., 3 Appleton St., Boston, Mass. Price, each, 75 cents without padlock.

(When Writing to Advertisers, Please Mention the Automobile Journal.)



Blackhawk Combination Wrench Sets contain all tools necessary for the repairing or overhauling work in a garage or service station. The set consists of a nine-inch ratchet wrench, two extensions bars, pipe wrench, brace wrench, universal joint, two spark plug sockets, five open end thin wrenches, pliers, combination tee and offset handle, double end screw driver, valve grinding attachment, cotter pin puller, 16 hexagon sockets, sizes 7-16, $\frac{1}{2}$, 9-16, 19-32, $\frac{3}{4}$, 11-16, $\frac{3}{4}$, 25-32, 13-16, $\frac{3}{4}$, 15-16, 31-32, 1 inch, 1 1-16, 1 $\frac{1}{4}$, 1 $\frac{1}{2}$ inch, and 11 square machined steel sockets, sizes, 7-16, $\frac{1}{2}$, 9-16, 19-32, $\frac{3}{4}$, 11-16, $\frac{3}{4}$, 25-32, $\frac{3}{4}$, 1 1-16 and 1 9-32. The case is a heavy wooden box, with hinged cover and finished in mahogany.

The company manufactures a complete line of wrenches of all kinds for the automobile and truck repairer, including Ford sets of various assortments, Buick, Cadillac, Cole-8, Chalmers, Chevrolet, Dodge, etc., covering practically all of the principal cars. These tools may be purchased in set form or separate as desired.

Manufactured by the American Grinder Manufacturing Co., Milwaukee, Wis. Prices vary from \$18 for the set described to smaller sets selling as low as \$3. Special prices of sets on application.

The Tirrill Headlight Regulator consists of a regulating switch having eight points of contact and a swinging arm attached. The switch is placed one-quarter of an inch below the hub of the steering wheel and fastened to the steering wheel post. It is placed so that the lever is at the right of the switch and within easy reach of the operator.

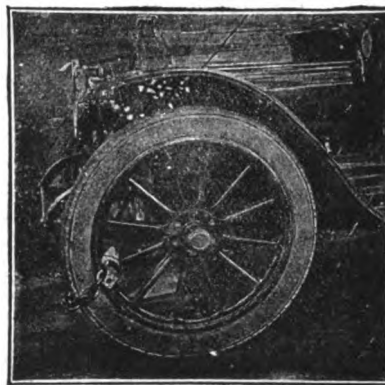
The purpose of the switch is to reduce the light through suitable resistance and



eliminate the glare of the headlights. The regulator may be attached to the lighting system when ordering. Adjustment within the switch provides for the no-glare position of the lever when used with different voltages.

The manufacturer claims that this device has been tried out successfully for two years and that it positively stops the glare of the headlights, and this when using the plain glass lens. The lever allows the operator to control the light so that it may be shifted from minimum to maximum easily and without damage to the lighting system.

Manufactured by Tirrill Manufacturing Co., Pittsburgh, Pa. Prices and literature on application.



The Woodworth Worth While Auto Lock consists of a heavy steel chain, having links two inches wide, made of one-half inch steel with a high grade Yale tumbler lock for locking the ends of the chain together around the tire and rim. The chain is covered with leather where it comes in contact with the paint of spoke and rim.

The manufacturer recommends that the lock and chain be used on the right front wheel. This lock does not prevent the car from being moved in case of fire, but effectively prevents stealing, as it causes such a bumping that the car cannot be run except very slowly and the chain makes such a clattering sound that the attention of the police would immediately be called to it if any one attempted to steal the car. The device is easily carried in the car, fits any style or size of wheel or rim, and is inexpensive. In emergencies it may be used as a mud hook, the manufacturer claims.

Manufactured by the Woodworth Manufacturing Co., Niagara Falls, N. Y. Price, chain and lock complete, \$6; without lock, \$2.50.

Lethermet Nails for automobile top upholstery embody the desired qualities for this class of work. They come enameled, to match practically any shade of leather or upholstery in plain and Spanish effects. The stems are of steel burred, so that they will not pull out under ordinary stress, and the points are sharpened. The heads are made in one piece and will not pull away from the stems.

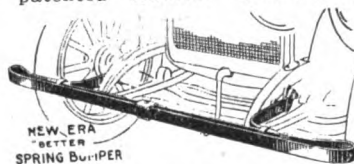
They are made in varying lengths and assorted sizes, according to the class of work for which they are to be used.

Manufactured by the Brewer-Titchener



Corporation, Cortland, N. Y. Prices on application.

The New Era "Better" Spring Bumper has patented features covering inter-



changeable attaching arms, fastenings and separated double bars (always the full proper width), which create a drum like rebound if any severe blow is made. The bars are highly tempered spring steel and

the attaching arms only semi-tempered. In case of a severe bump the arms will be the part that will suffer the most damage, the manufacturer claims.

The bumper is covered by a liberal guarantee and the manufacturer will make good all damaged or defective parts of the bumper when returned to the factory by any one not a dealer or jobber, when the express has been prepaid. The bumper is suitable for attaching to any passenger car or truck.

Manufactured by the New Era Spring and Specialty Co., Grand Rapids, Mich. Price, black, \$10.50; nickel, \$12.00.

The Safety Oiling System for Engines consists of an auxiliary oil tube passing from front end of the engine base to the top of the transmission cover. A special cover is fitted to the transmission case, having a filter attached, and the manufacturer claims that this is capable of catching fabric thrown off from the band linings, particles of metal, etc.

The oil is thrown upward by the balance wheel and transmission drums and is caught by the oil pan, shaped like a



shovel; filtered by the teeth of the filter and allowed to pass down and into the oil pipe extending to the front of the base of the engine. The object of using this device is to secure a positive flow of oil to the Ford engine.

The manufacturer allows a 30 days trial and will refund purchase price if the buyer so desires.

Manufactured by the M & M Co., 480-500 Prospect Avenue, Cleveland, O. Price, \$5.

Mac-Lar Storage Battery. The Mac-Lar Storage Battery is new to the trade, and the claim of the manufacturer is that the plates or grids are treated by a special patented process which makes them extremely hard so that they have unusual capacity and recharging efficiency. The hard plates also insure longer battery life and a higher momentary discharge rate. It is further claimed that the Mac-Lar battery has a 25 per cent. greater capacity for the same plate area than a soft plate.

Tests have been given the battery by the manufacturer that are claimed would not ordinarily be met with in service and the results have shown it is superior to other batteries of the same type. The



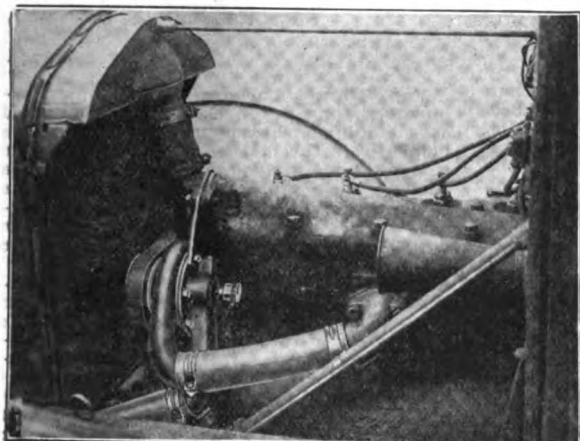
battery is guaranteed by the manufacturer for 18 months service and claim is made that it will endure longer than the guarantee.

The Mac-Lar battery is built in two standard shapes for replacement purposes and will fit 99 per cent. of all cars. The two shapes are built for six volt and 12 volt battery work, making four standard Mac-Lar models. Universal terminals are furnished with each battery so that they may be easily and quickly connected.

Manufactured by the Mac-Lar Battery Co., Detroit, Mich. Price, six volt size, \$25; 12 volt size, \$36.

(When Writing to Advertisers, Please Mention the Automobile Journal.)

Atlas Special Pump for Ford Cars. The Atlas Special Pump for Ford cars is a centrifugal type that is attached to the water connection at the top of the engine by a bracket. To attach the pump the two screws that hold the water connection to the engine head are removed. The connection is slipped apart, the gasket taken out, the bracket put in place with a gasket each side and the water connection is rebolted with two special bolts supplied with the pump. The pulleys of the pump, fan and crankshaft should line up, as the same belt drives the fan and pump from the crankshaft. This may be ac-



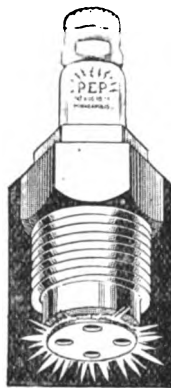
complished by bending the brackets slightly till they line. Hose connections are made at each side of the pump.

It is claimed by the manufacturer that overheating is prevented by the use of this pump; that steaming and evaporation are reduced to minimum, and that higher percentages of anti-freezing solutions may be used. The pump is made of highest grade of materials and is equipped with bronze bearings.

Manufactured by the Atlas Brass Foundry Co., Columbus, O. Prices and literature on request.

The Electric Spotlight No. 100 is a spotlight with universal bracket for attaching to the windshield of any car. It has a quickly adjustable focus, and a positive key switch in handle. It is equipped with a waterproof cord for attaching to the lighting system of the car and is fitted with a condensing mirror on the side of the lamp. It has a silver plated parabolic

The Pep Self-Cleaning Spark Plug offers a new feature in spark plug construction, the manufacturer claims. The disc electrode, covering the lower end of the Pep, gives two inches of sparking surface, and the size of the disc causes the electric current to expand, giving it greater volume. The result, the maker states, is a ring of large hot sparks all around the outer edge of the disc, giving better combustion, even on a poor mixture or with a weak battery or magneto current. There

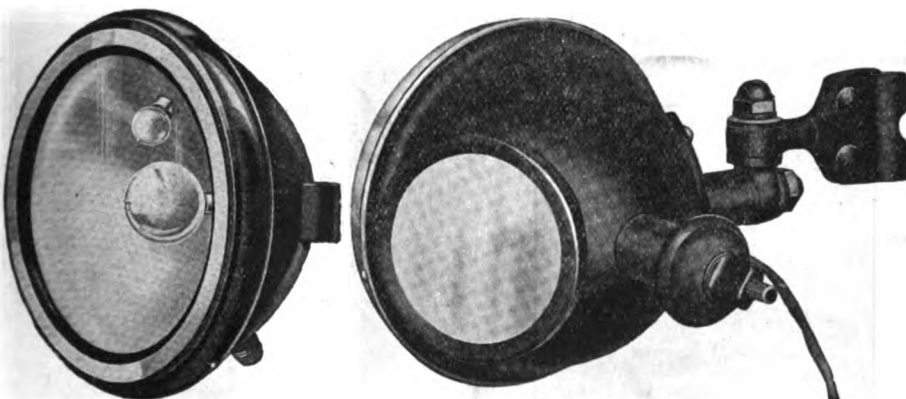


is much less pull on the battery or magneto and the engine will show more snap and pep, according to the manufacturer.

It is further claimed that the Pep spark plug is self-cleaning because the ring of hot sparks all around the edge of the disc is constantly loosening and burning away any particles of carbon which may form and because of the continuous back and forth movement of the gases from alternate compression and explosion, keeping the carbon and oil from stopping in one place long enough to become fixed.

Manufactured by the Pep Spark Plug Co., 932 McNight Building, Minneapolis, Minn. Price, \$1.

The Electric Side Lamp Model No. 510 for Ford Cars is an attractive side lamp of new design, harmonizing with the contour of the headlights. It consists of a heavy rolled door that is easily removed and has a positive set screw lock. The interior of the lamp is easily accessible,



reflector, one-piece heavy steel body, bayonet type door nickel plated and made for either oval, round or square windshield frames.

The manufacturer claims that this lamp is handy for reading signs, or driving, etc., and may be quickly changed from one focus to the other by merely changing the focus adjustment.

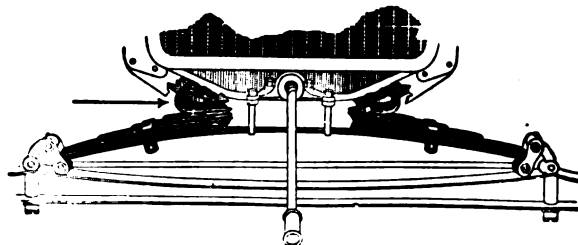
Manufactured by the Jno. W. Brown Manufacturing Co., Columbus, O. Prices and literature on application.

and is fitted with a polished silver plated reflector with adjustable focusing device and four candlepower 6-8 volt Mazda bulb. This lamp is usually supplied with a combination prop, but is regularly supplied with stud to fit 1915, 1916, 1917 and 1918 Ford cars. The regular finish is black enamel or combination black and nickel front.

Manufactured by the Jno. W. Brown Manufacturing Co., Columbus, O. Prices on application.

(When Writing to Advertisers, Please Mention the Automobile Journal.)

The Saver Ford Front Spring for Ford Cars consists of the regular Ford front spring having an extra spring leaf attached at the center of the regular spring, with the ends bent in the form of a loop. When in use the springs take position at each side of the bottom of the radiator, their purpose being to help out the Ford spring when carrying heavy loads. When the spring is deflected three-fourths of its arc the open loop comes into contact with the V angles of the frame so that the open loops absorb the extra heavy thrust of the spring and, the manufacturer claims, prevent the spring from breaking.

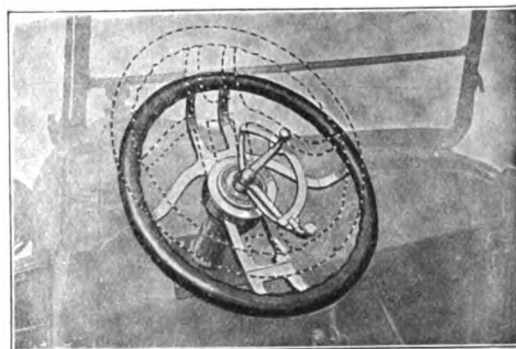


The Saver spring is uniformly oil tempered from end to end by a new process, and graphite is placed between the leaves for lubrication. The spring is guaranteed against breakage and a new spring will be supplied if one is found faulty.

Manufactured by New Era Spring and Specialty Co., Grand Rapids, Mich. Prices on application.

The Monarch Auto Lock consists of a locking device attached to the steering post of the car, having a wheel that in the locked position is forward of the driving position. The lock is composed of a Yale cylinder and a pair of Yale keys. The lock is made of aluminum alloy, while the center piece, called the driving lug, is composed of red brass. The space between the jaws below the hub is much wider than between the driving jaws when the wheel is on center in the driving position. When the wheel is pushed forward the space being so much wider below, it cannot grasp the driving lug. In this manner the wheel is entirely disconnected from the steering post and it is impossible to drive the car when the steering wheel is pushed forward and disengaged from the steering post.

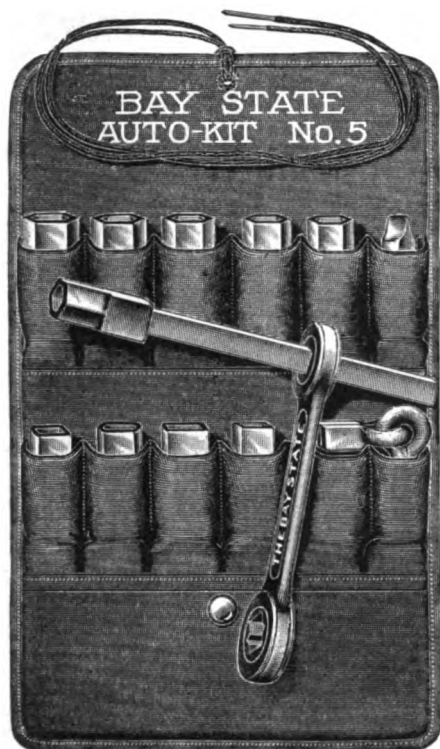
The only time that the lock can be disassembled is when the wheel is in the driving position. All bolts and nuts that secure the top cap are concealed when the wheel is in the locked position.



The maker claims that it is impossible to steal a car locked with the Monarch as with its method of locking a thief could not get away with the car either by towing or operating it.

The tilting wheel effect is claimed to be an advantage in the case of a stout person, as it allows a roomy passage behind the wheel when entering.

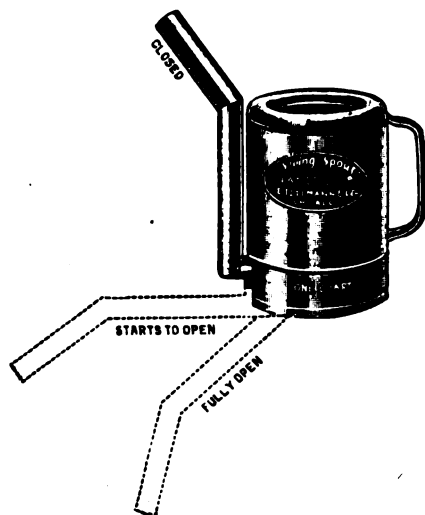
Manufactured by the Monarch Auto Lock Co., 337-367 Market Street, Kenosha, Wis. Prices and literature on application.



The Bay State "Autokit" Socket Wrench Set No. 5 consists of 10 heavy gauge steel sockets, case hardened, as strong and tough as it is possible to make them. The hexagon, square and oval are especially adapted for use on the Ford car, but are carefully selected so as to be available for any car. The set comprises a hardened steel screw driver, finely finished; a universal joint to reach the hard places, a seven-inch steel extension bar and a double end ratchet wrench which fits both the sockets and the bar and is reversible. The set is contained in a black cloth roll made of heavy drilling, not pantosote. The pockets in the roll are made to stand open when empty so that the insertion of parts is quick and easy.

Manufactured by the Bay State Pump Co., 100 Purchase St., Boston, Mass. Price, \$5.

The Swing Spout Oil Measure consists of an oil can with a patented spout that closes and stops the flow of oil when in a vertical position, and when in a down or



partially down position allows the oil to flow freely. It is made in one and two-quart sizes, of heavy material that will

(When Writing to Advertisers, Please Mention the Automobile Journal.)

stand up under hard abuse. The spout has a patented shut off or valve with a ground fitting so that oil cannot leak, and is the proper length for supplying oil to such cars as the Buick, Mitchell, etc., and other cars where the filling spout is difficult to reach.

The Swing-Spout oil measure is guaranteed to the jobber in that if he buys a reasonable quantity and cannot sell them within 90 days, at the expiration of that time he may return them and receive his money back.

Manufactured by E. Edelmann & Co., Chicago and New York City. Prices on application.

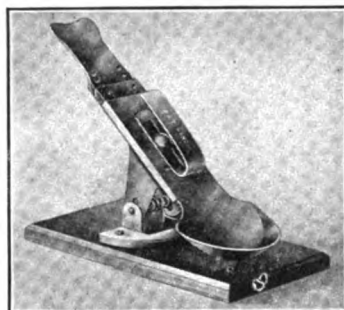
The Bay State "Autokit" Socket Wrench Set No. 1 consists of 31 socket wrenches, with swiveling reversible ratchet handle, several extension shanks, a universal joint and a heavy screw driver. By means of the various combinations of which these parts are susceptible it is easy to remove any one of the many nuts and cap



screws on a car by a ratcheting motion. One long socket fits the spark plugs, which can in this way be removed without danger of breakage. The set is packed in a neat wooden box with hinged cover, easily carried in the tool box of the car or truck and occupies but little space.

Manufactured by the Bay State Pump Co., 100 Purchase Street, Boston, Mass. Price, \$12.

The Universal Accelerator Foot Rest consists of an appliance that is attached to the floor of the car, resting on the accelerator button. The foot rest is adjustable in four ways, height, length, distance from heel to instep, and the end of



the rest can be bent up or down to accommodate the foot. It is designed to accommodate all sizes of feet and may be attached to the accelerator pedal quickly. The device is made of high-grade pressed steel, polished and nickel plated.

Manufactured by the Joseph Pollak Tool and Stamping Co., 81-85 Freeport Street, Boston, Mass. (Dorchester District). Sold by Malton Specialty Co., 213 Columbus Avenue, Boston, Mass. Price, \$2.



Van Briggie Carburetors. A new carburetor for Ford, Dodge and Maxwell cars employs what is termed an airplane principle in the method of carburation. By this method, instead of sucking in more fuel at higher speeds of the engine, this carburetor actually decreases the fuel supply; in other words, the faster the car travels the less gasoline used, is the claim of the manufacturer.

There is only one adjustment, no venturi tube, no by-passes, no auxiliary air valves and no weights. The maker claims that the principle of the model P-F carburetor for Ford cars is such that an increased velocity of the air through the carburetor automatically decreases the gasoline coming out of the nozzle, and that vaporization is more complete owing to the whirl in the mixing, which breaks up the gas into minute particles. It is easily installed by any mechanic in a few minutes time without special tools. Satisfaction is guaranteed within 30 days or money will be refunded.

Manufactured by the Van Briggie Motor Devices Co., Indianapolis, Ind. Price, Ford, model P-F, \$10; model P-D for Dodge, \$18; model P-T for Maxwell, \$15.

The Corbin-Brown Ford Special Speedometer consists of an instrument combining a speedometer with a maximum speed hand that indicates the highest speed attained during a trip and which is set back to zero by means of a tripping device, a luminous dial for night driving that plainly illuminates the dial, and total and trip mileage. The maker states that the material used in the construction of this instrument is of the best, no white metal

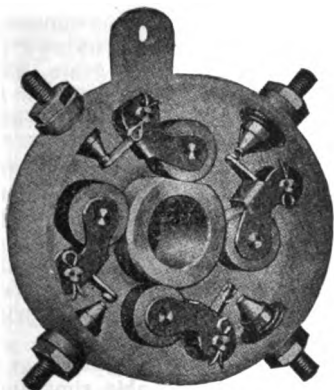


or die cast parts being employed. It is claimed that this device for Ford owners is accurate, simple in construction and may be installed by anyone in a few moments.

Manufactured by the Corbin Screw Corporation, New Britain, Conn. Prices and literature on application.

The Duntley Magneto Break Timer for Ford Cars. The Duntley Timer is built to have all roller contact on the cam, having four rollers, one at each contact, as shown in the cut. The rollers operate on a solid cam having a flat surface on one side, the tops of the rollers being fastened by suitable pivots to the case. From the top of each roller holder or caster a small arm is suspended that makes contact with the end of the terminal post at the edge of the timer case. The timer contacts are an alloy metal that will not burn and carry the current from the rollers through the arms to the contacts, and thence to the terminal.

It is claimed by the manufacturer that with this timer it is possible to start a

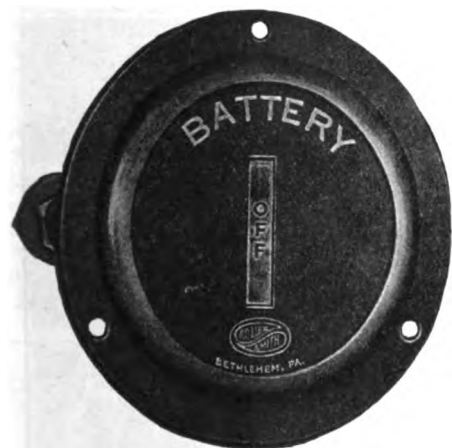


car easily in cold weather, as it delivers large sparks perfectly timed to all four cylinders; that no oiling is required and that it saves fuel and increases car mileage. It is guaranteed for the life of the car. Ten days trial is allowed and money is refunded if the timer is not satisfactory.

Manufactured by Jack Duntley, 1004 Michigan Ave., Chicago, Ill. Price, \$6.

Universal "C. O. D." Indicator. The Universal "C. O. D." Indicator is designed to be placed on the dash of a car and shows at a glance whether the electrical system is operative. It may be used on any car with any system or any voltage is the claim of the manufacturer. It is a flush type, finished in black.

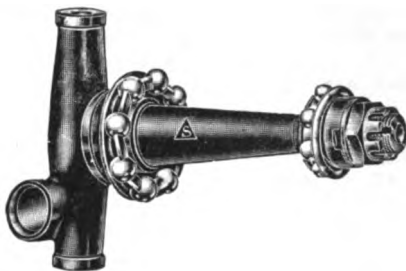
The outstanding feature of this instrument is its universal application. The ordinary indicator designed for lighting cir-



cuit work will not function when installed in a cranking circuit, as for instance, on cars equipped with single unit, single wire systems. This instrument is designed to fill this need and is especially suited for cranking circuit work. The C. O. D. Indicator is so-called because of the three indications on its movable barrel of "Charge," "Off" and "Discharge."

Manufactured by the Roller-Smith Co., 223 Broadway, New York City. Prices and literature on request.

Star Semi-Annular Bearings for the Ford and Chevrolet 490. Star Semi-Annular Bearings for Ford and Chevrolet 490 cars consist of two sets of ball bearings accurately spaced by a spacer, that are fitted to the front axles in the places of the regular bearings. The separator is punched from a single piece of stock and the openings for the balls are accurately

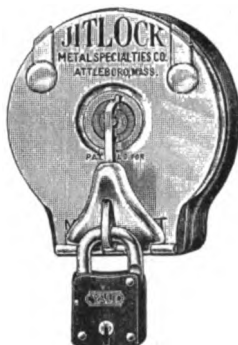


punched. After the balls are inserted in the spaces the lips of the spacer are turned in, holding the balls securely in place. The balls used are the Hoover chrome balls and are guaranteed.

It is claimed by the manufacturer that friction is reduced by the use of this bearing, that the car steers easier, that the balls are held in line better and do not zig-zag on the cones. It is further claimed that longer life to the cones is assured by their use, as the adjustment of the cones is better provided for.

Manufactured by Stevens & Co., 375 Broadway, New York City. Price, \$2.50 a pair; \$5 a set of two pair.

The "Jitlock" for Ford Cars. The "Jitlock" for Ford cars is a locking device that may be applied to the regular switch key used on the Ford switch. It is made of three pieces for 1918 or later cars and is fastened in place as follows: The regular Ford switch cover is removed and replaced with a switch cover provided in the device. The second section covers the first and is fastened by two screws at the top to the switch cover previously mentioned, this section being provided with a hinge at the bottom. The third section is the final cover and is placed over two lugs



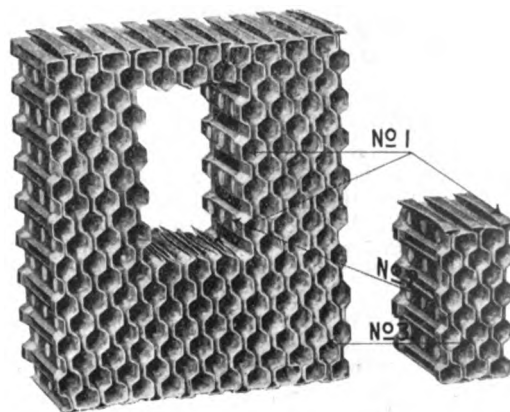
extending upwards from the second section and the lugs snapped into place. A screw is inserted at the bottom fastening the three sections securely. To lock the switch the hinge is raised and slipped over the Ford switch key and a padlock inserted through the hole in the key. Special fittings are available for Fords earlier than 1918. Finished to match the metal parts of the switch and coil box. The manufacturer claims that it will prevent a car being stolen as thieves will rarely tamper with a car that is locked.

Manufactured by the Metal Specialties Co., Attleboro, Mass. Price, \$1.50.

Wabash Honeycomb Radiators. One of the main features of the Wabash Radiator is the large cooling capacity. This is made possible by the arrangement of the corrugated brass sheets forming the water channels (No. 1). These channels contain small pockets, increasing the water

capacity of the radiator to a great extent (No. 2). In this construction the distance is increased in which water must travel from the inlet to the outlet connection, thereby prolonging the time in which the water comes in contact with the radiator surface.

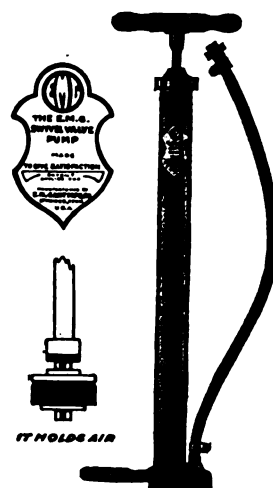
The Wabash core contains no dead channels, or so-called dead tubes, every channel containing water. Each channel is constructed of only one layer of brass and not several layers. Air rushing through



the roomy air passages (No. 3) between the channels, absorbs the heat rapidly from the water through the one layer of brass, the manufacturer claims. Wabash radiators are guaranteed to give satisfaction in every detail.

Manufactured by the Wabash Auto Radiator Manufacturing Co., 1117 Wabash St., Chicago, Ill. Prices on application.

The E. M. G. Swivel Valve Tire Pump. The E. M. G. Swivel Valve Tire Pump consists of a single cylinder of 16-gauge steel tubing, 1 1/4 inches diameter and 20 inches long and screwed into a heavy malleable iron base, with folding foot rest. The plunger rod is heavy cold rolled steel with detachable handle. The tubing connection for the tire valve is 24-inch reinforced fabric rubber with screw connection to fit any standard tire valve. The pump is finished in baked green enamel. The pump is 24



inches over all. It has an extra heavy oil treated leather cup on the plunger and a special air valve on the side of the plunger rod insures a full pump load of air at each stroke. The plunger head rides straight from the top to the bottom regardless of any turning movement of the handle.

Manufactured by E. M. Gant Manufacturing Co., Inc., Etahridge, Tenn. Sold by John E. Chumley & Co., Nashville, Tenn., sole selling agents. Price, \$3.25.

(When Writing to Advertisers, Please Mention the Automobile Journal.)

UTILITOR, COMBINATION OF TRACTOR AND STATIONARY ENGINE, FILLS REAL NEED

EXHIBITED for the first time at the recent National Tractor Farming Demonstration at Wichita, Kan., the Utilitor, a small tractor developed especially for a diversity of work that could not be done manually and which could not be as well done with the use of a single animal, has attracted wide attention.

Its maker, the Midwest Engine Co., Indianapolis, Ind., states that it is a combination tractor and stationary engine that will do more work than one horse or mule and will do it better and more economically. It will plow, harrow, drill, cultivate, cut hay, mow lawns and pull small loads when used as a tractor. As a power plant it will saw wood, drive a water pump, feed grinder, corn sheller and fodder cutter, turn grindstones, drive separators, churns, milking machines, washing machines and small lathes, and, in fact, do any work for which a four-horsepower engine is adapted.

The tractor when used for field operations is usually guided by the operator, who walks behind it, but when utilized for mowing the operator may ride. It is

essentially a power plant mounted between two small bull wheels, the rear of the main frame being carried on a pony truck. It is guided by two levers or posts that extend backward from the main frame at an angle to a height slightly above the waist of a person of average stature.

While these levers are separate, they are used much the same as the handle bars of a bicycle or motorcycle, each carrying control members that are actuated by the hands without removing them. The engine is a single-cylinder, four-cycle, water cooled, L-head, vertical type, $3\frac{1}{2}$ by $4\frac{1}{2}$, driven at a speed of 1200 revolutions per minute. The drawbar power is rated as $1\frac{1}{2}$ -2 and the belt horsepower as 2-4.

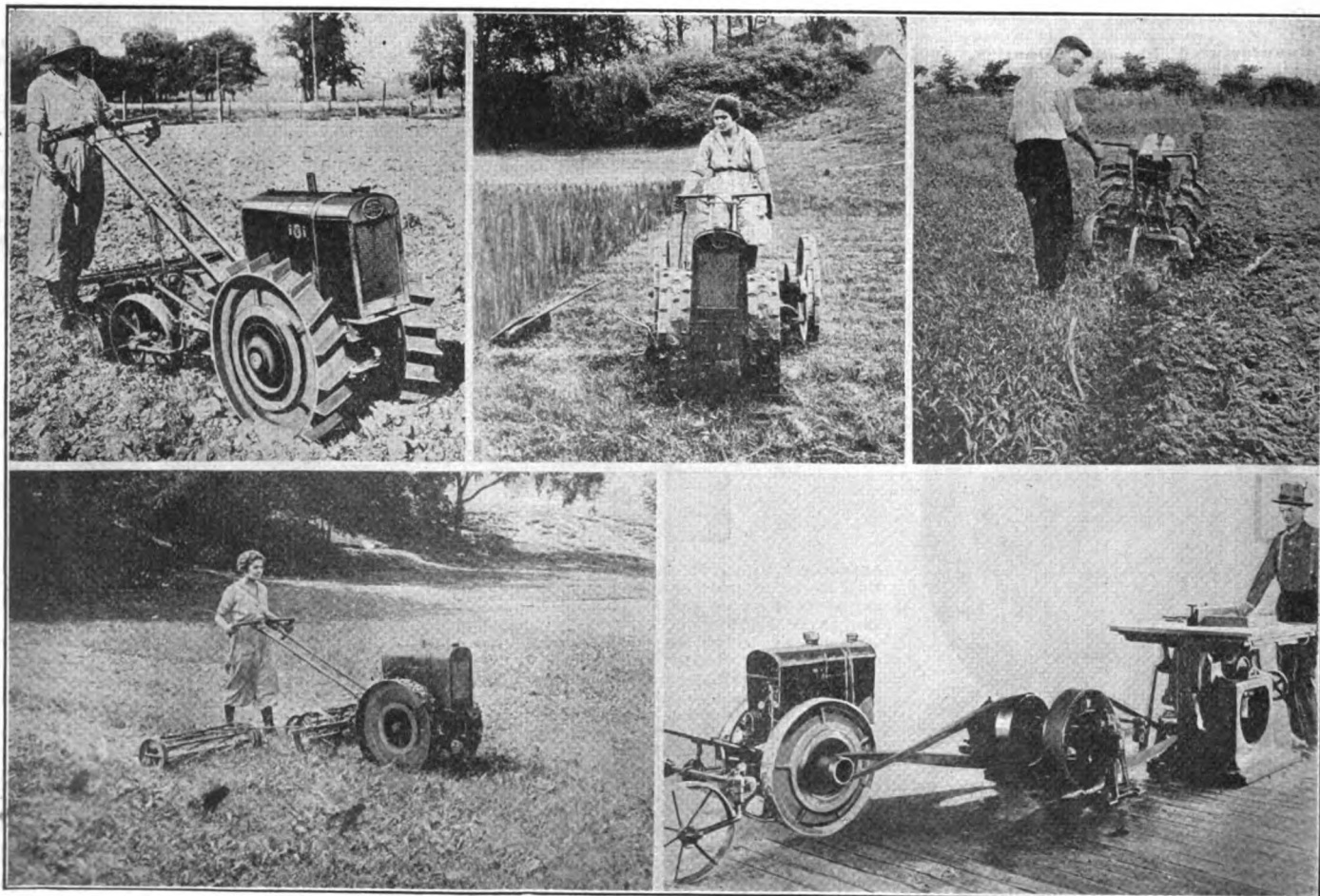
At the forward end of the frame is a honeycomb radiator and the engine is cooled by a thermo-syphon circulation of water, and a fan directs a draft of air through the cooling section of the radiator. The engine is lubricated by a combination splash and gravity system. The ignition current is generated by an Elsemann high-tension magneto, which has

one wire leading to the spark plug.

There is a button switch for the magneto for short-circuiting and stopping the engine quickly. The fuel is supplied through a Kingston model Y carburetor, fitted with a dry air chamber. There is a positive clutch control for each wheel, operated independently, so that in turning, for instance, the machine can be pivoted on one wheel by its own power. The drive is by internal gears, the gear reduction being 35 to 1. There is one forward speed that can be graduated from one to four miles an hour.

The tractor is designed so that the implements may be hitched to obtain the best working positions. The maker states that the tractor will draw a seven-inch plow in practically all conditions of soil, and that it can be used with a small disc plow, a cultivator, drill and other implements.

The Utilitor, with standard or cultivating quickly detachable rims and belt pulley, is listed at \$345 f. o. b. Indianapolis. The accompanying illustrations show some of the uses that may be made of the machine.



The Utilitor Tractor: Upper Left, Woman Operator Using a Disc Harrow; Upper Center, Mowing Hay, the Woman Operator Riding the Implement; Upper Right, Working with a Seven-Inch Plow, the Man Controlling and Guiding It with One Hand; Lower Left, Cutting Grass with a Double-Hitched Pair of Lawn Mowers; Lower Right, as a Stationary Power Plant for a Circular Saw.

HUMOROUS SIDE OF MOTORING

WORM WILL TURN.

In the worm-drive truck, come what traction troubles may, the worm will turn.

SOME SUCCESS.

"What's Dubwalte doing out there in the street?"

"He's addressing a few remarks to his motor car."

"Is he getting any results?"

"I presume so. Half a dozen windows in the neighborhood have been pulled down with a bang."

INCLUDED IN THE SERVICE.

The time will come,
Now mark my words!
When charge for bed and board
At every hotel will include
The guest's use of a Ford.

WHICH?

"That woman on the corner waiting for a trolley car refused your offer of a lift rather superciliously."

"So she did," replied the obliging man. "And now I'll never know if she turned up her nose at my company or my flivver."

FAMILIARITY.

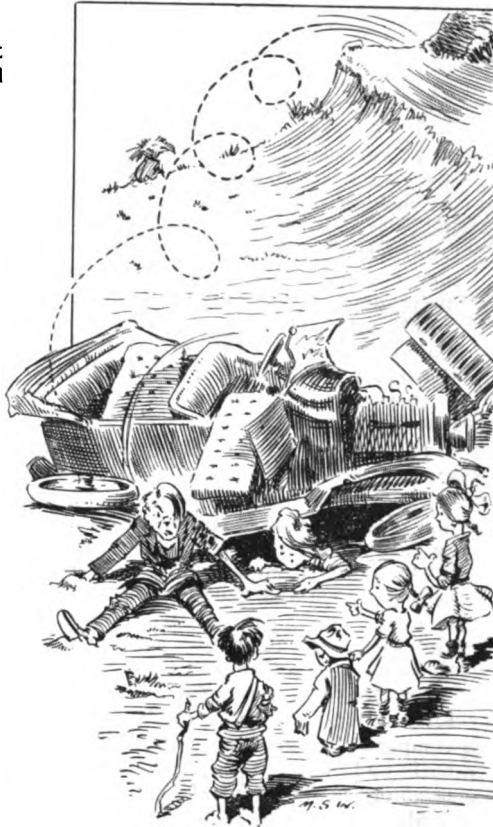
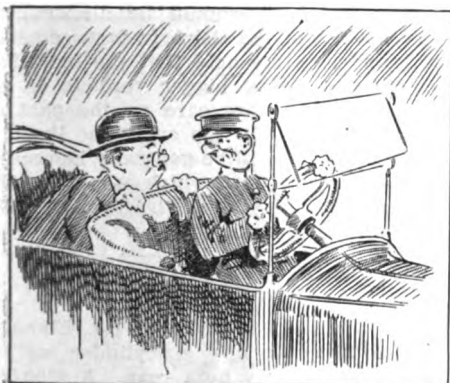
"People are not nearly so formal as they used to be."

"No," said Mr. Chuggins, "nearly every time I go out flivvering policemen to whom I have never been introduced don't hesitate to speak to me."

HIS OWN CAR NOW.

"You used to drive much faster than this," said the rich man to the taxi driver, "when you were employed as my chauffeur."

"Yes, sir, I know," replied the chauffeur, "but you owned the car then. This is my own car I'm driving now."



IN THE MOUNTAINS.

Editor Automobile Journal:

Possibly you can use the following anecdote. It is entirely true.

Our car skidded off the narrow mountain road and rolled for 50 yards down through a steep cornfield. By a miracle, certainly, not one of us was hurt.

By the time we had crawled out a

SKEPTICAL.

You can't get the fellow in the road with a puncture to believe they change 'em in 27 seconds in speedway races.



group of ragged mountain children had collected from the cabin nearby. They gazed wide eyed and open mouthed at the hill, the shattered car, and us.

"Lordy, mister!" finally spoke the raggedest. "Lordy! You-uns 'll shore have to be shot at the judgment day!"

—Delight Bernhardt.

Lenoir, N. C., Aug. 31, 1919.

UNCANNY FLIVVERS.

They stood at the curb as a flivver went by.

"It may be," said one, "but I doubt it.

"It looks like a flivver, I will not deny, "But there's something uncanny about it."

ODOMETERS.

"If those odometers are really efficient," said wife, "you'd better get one for our car and get rid of that smell."

OUR POET SAYS.

Little drops of water,
Little grains of sand,
In your carburetor
Bring you to a stand.

DO YOU KNOW?

"What's the resemblance between a horse amid-stream and the average American?"

"Both are in a Ford."

NO DOUBT.

This well known truth no doubt you've found.

If ever you inquired

A motor car will ride you best
When it's completely tired.

LONELY ROAD HINT.

The car was stopped on a lonely road. "I can't start my engine—the thing won't spark," said Irving.

"Must be like some people I know," said the pretty Helen.



PLAN BIG INCREASE IN PRODUCTION

Automobile Census in Principal Cities

City	Population	Number Motor Vehicles
Des Moines, Ia.....	104,052	15,000
Omaha, Neb.....	177,000	23,000
Detroit, Mich.....	619,000	80,000
Los Angeles, Cal....	535,000	63,229
Oakland, Cal.....	206,000	24,000
Seattle, Wash.....	366,000	37,800
Cleveland, Ohio.....	700,000	64,000
San Francisco, Cal..	471,000	40,000
San Diego, Cal.....	128,000	10,000
Denver, Col.....	268,000	22,000
Birmingham, Ala....	200,000	16,000
Providence, R. I....	250,000	20,000
Spokane, Wash.....	157,000	12,500
Albany, N. Y.....	106,000	8,200
Richmond, Va.....	158,000	12,000
Kansas City, Mo....	305,000	22,850
Portland, Ore.....	308,000	22,500
Indianapolis, Ind....	300,000	22,000
Milwaukee, Wis....	450,000	30,000
Syracuse, N. Y.....	158,000	10,000
St. Louis, Mo.....	768,000	48,500
Cincinnati, O.....	414,000	25,000
Rochester, N. Y....	264,000	15,000
Newark, N. J.....	418,000	21,500
Louisville, Ky.....	250,000	12,500
Buffalo, N. Y.....	500,000	25,000
Salt Lake City, Utah	121,000	6,000
Atlanta, Ga.....	200,000	9,000
St. Paul, Minn.....	250,000	11,000
Baltimore, Md.....	600,000	21,000
New Orleans, La....	377,000	12,000
Boston, Mass.....	800,000	23,255
Chicago, Ill.....	2,500,000	68,100
Philadelphia, Pa....	1,735,000	46,782
New York, N. Y....	6,000,000	138,758

ARMY TO SELL USED CARS.

The Motor Transport Corps will offer for sale at public auctions, to be held in the immediate future at army camps and storage yards, a total of 1243 used passenger cars, trucks, motorcycles and bicycles. These vehicles in their present condition are unserviceable for army use, but a number of them can be made usable by proper repairing.

"The War Department has no new or serviceable passenger automobiles for sale at present, and it is not anticipated that it will have any new passenger cars available for sale to the general public," it was announced.

On Sept. 18 at Camp Holabird, near Baltimore, Md., 295 unserviceable motor vehicles will be sold. Embraced in this sale will be 56 passenger cars, five light delivery trucks, over 200 heavier trucks and several motorcycles.

On Sept. 19 and Sept. 20 auctions will be held at Norfolk, Va., and Camp Hill and Camp Stewart, near Newport News, Va. There will be other sales at Philadelphia, Cape May, N. J., and Omaha, Neb.

Some Auto Makers Are To Double Output Next Year

AUTOMOBILE manufacturers in Michigan and Ohio plan to increase production next year from 33 1/3 to 100 per cent. They estimate that there is a shortage of 2,500,000 cars. By rushing production the remainder of this year 1,500,000 cars may be made. Contracts are being made for new buildings and equipment and the industry is undergoing tremendous expansion.

Labor disturbances in plants of parts makers are still causing a big production curtailment. The greatest difficulty is in getting parts from Cleveland parts makers.

The Hudson Motor Car Co. is fortunate in having approximately \$8,500,000 worth of automobile material in its warehouse, and this company has been able to operate independent of the parts makers.

The Ford Motor Co. is now averaging between 3000 and 3200 cars daily. It is now making one-third of all its bodies and within the next few months expects to be making all of its bodies.

The Reo Motor Car Co. is getting into fair production on its new Reo Six. The company is running nearly 100 trucks daily and claims to be the greatest truck producer in the industry.

All of the General Motors units maintained production schedules and registered increases in several cases.

UNLIMITED RISKS ON AUTOMOBILES ARE PROPOSED.

In response to a demand developed by the increasing size of damage judgments rendered against owners of automobiles as a result of suits due to claims for personal injuries, insurance companies writing automobile risks are considering the removal of the maximum limit placed in their liability under existing contracts. In the event the maximum is removed and the policies are thrown open to cover whatever loss the owner of an automobile is called upon to pay, automobile liability insurance rates will be increased about 25 per cent.

Under the present underwriting system the insurance companies will sell policies covering the owners of automobiles for almost any amount desired, but only a very few persons carry insurance in excess of \$20,000. The ordinary policy provides for the payment of \$5000 as indemnity to the policy holder in case he is called upon to pay that much in damages for injuries to a single person and \$10,000 indemnity if more than one person is involved in the suit. The vast majority of automobile owners carry these low-limit policies, and as the majority seldom have serious accidents they have never appreciated that they are in fact very much under insured.

Judgments recently rendered in suits for damage against automobilists indi-

Daily Records For Car Production

	June	July	August
Buick	500	500	500
Briscoe	75	75	50
Barley	10	10	7
Cadillac	70	70	80
Chalmers	60	65	70
Chandler	100	90	70
Chevrolet	720	730	730
Columbia	30	30	25
Dodge	450	375	425
Dort	100	100	100
Ford	3000	3000	3100
Hudson	110	110	120
Hupmobile	75	75	40
King	12	15	15
Liberty	40	40	40
Maxwell	200	200	200
Oakland	265	250	300
Olympic	10	9	9
Oldsmobile	140	140	160
Overland .....	..	200	250
Packard	25	25	25
Paige	75	75	50
Paterson	15	16	15
Jordan	15	15	15
Maibohm	7	10	10
Reo	125	125	150
Saxon	30	30	30
Scripps-Booth	50	55	55
Studebaker	165	165	165
Peerless	10	12	25
Winton	10	12	12
Essex	110	110	120
Grant	40	40	40

cate that the average jury is inclined to take the high cost of living fully into consideration when rendering a verdict. Some of the verdicts have astounded the courts, and have been set aside at once by the trial court.

Others have gone to higher courts and in some cases been affirmed. As a rule the courts reduce excessive judgments, and as a result of a compromise between the parties the suits seldom come up for retrial.

The only question before the underwriters at the moment in connection with the proposal that the limit placed on contracts be removed has to do with the question of public policy. Some of the underwriters contend that the owners of the automobiles should be allowed to carry some of the risk. In fact, some of the underwriters hold that the fact that juries are giving bigger verdicts is responsible for more care on the part of owner-drivers. In the event the limit is removed rates will be generally increased about 25 per cent., which would enable the automobilists who already carry big policies to save money.

HUFFMAN PLANS CAR.

The Huffman Bros. Motor Co., Elkhart, Ind., will put a new six-cylinder car on the market early next year. A \$200,000 addition is being built to the truck plant.

Leach-Biltwell Motor Refinements Make New Velie Six Model Better Car Even Than Its Predecessor

Co. Will Market New Car

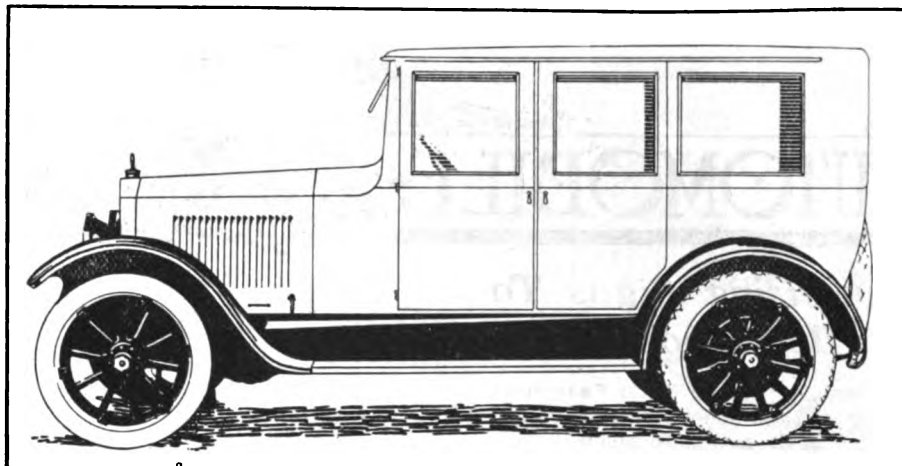
The Leach Biltwell Motor Co. has been incorporated for \$1,000,000 and has absorbed the Leach-Biltwell Co. The concern will manufacture a six-cylinder passenger car to be called the Leach Power Plus Six. The officers are M. A. Leach, president; L. G. Martin, vice president; E. P. Hughes, secretary and treasurer; R. A. Wilson, production manager; R. P. Pennock, superintendent; J. H. Faircloth, purchasing agent; C. N. Graves, eastern factory representative.

M. A. Leach was at one time in the lumber business and later established Pacific coast distributing connections for the Dort Motor Car Co., Flint, Mich. Afterward he formed the Leach Motor Car Co., operating in Los Angeles and San Francisco as motor car distributors. For the past year he has been turning out custom made motor cars.

C. N. Graves, making his headquarters with the Bradfield company, 910 Kresge building, Detroit, has already placed orders for material for 900 cars. The company will buy its units in the eastern market and ship them knocked down for assembly in the Los Angeles plant. The car will be built of standard units. The company will either have a display or representatives at both the New York and Chicago automobile shows. Plans for a new factory for the company will be announced soon.

CONTINENTAL AUTO PARTS CO. MOVES TO NEW PLANT.

The Continental Auto Parts Co. of Knightstown states that it is being moved to Columbus, where six times the present floor space is provided in the plant formerly occupied by the Janney Manufacturing Co., builder of agricultural implements. Practically the entire personnel of the Continental organization moves to Columbus, where an almost immediate increase in production is planned to enable the firm to catch up with orders and develop several new lines. The Continental Auto Parts Co. has been building a well known line of shop equipment such as motor stands, axle stands, radiator stands, welding and assembly tables, industrial trucks, jacks, hoists, wrecking trucks, creepers, bushing presses, crankshaft straightening presses and burning-in machines. This line has been in such demand that for the past two years the factory has been four to five months be-



Velie Four-Door Sedan, Six-Passenger, Model 48.

IN THE new Velie Six the body is of the straight line type, blending into a high beveled cowl with tapering hood and high radiator. Bevel board fenders are a new feature. There are octagonal lamps and a radiator distinctly different in outline. The body is longer, with broad doors and more room in the deep tilted seats.

Velie has a new motor, a Velie-Continental, 40 horsepower. The cylinders are cast en bloc, with a 3¼-inch bore and a

4½-inch stroke. The gasoline tank has been enlarged and fitted with a convenient filler. Soft spring oilers assist lubrication. The chassis is protected from mud or water by additional splash guards both front and rear, a feature the motorist will appreciate.

There are five body styles, the five-passenger touring car, four-passenger sport car, four-door six-passenger sedan, four-passenger coupe and two-passenger roadster.

hind in filling orders. According to J. H. Staley, who is the originator of Continental Shop Equipment, the new Columbus plant provides the necessary space and equipment to permit an almost immediate increase in production. Seventy-five thousand square feet of floor space is available. The new quarters are completely equipped with a foundry, blacksmith shop, wood working department, paint shop, machine shops and a large warehouse with railroad connections and car level shipping platform.

ANDERSON HAS \$1,000,000 INCREASE IN ITS CAPITAL.

The Anderson Motor Co., Rock Hill, S. C., has increased its capitalization from \$2,625,000 to \$3,625,000, and is erecting a new steel and concrete building, 340 by 250, equipped with new machinery. Contracts have been awarded amounting to \$200,000. It is expected that this new factory building will permit a material increase in the production of Anderson Six motor cars.

BREEZE ISSUES BOOK DESCRIBING FLEXIBLE METAL HOSE.

The Breeze Manufacturing Co., Newark, N. J., has just issued an unusually interesting trade 36-page book dealing in detail with the subject of flexible metal hose. There is no catalogue in this country on the subject. One was issued in a foreign country years ago, but contained nothing but figures and prices.

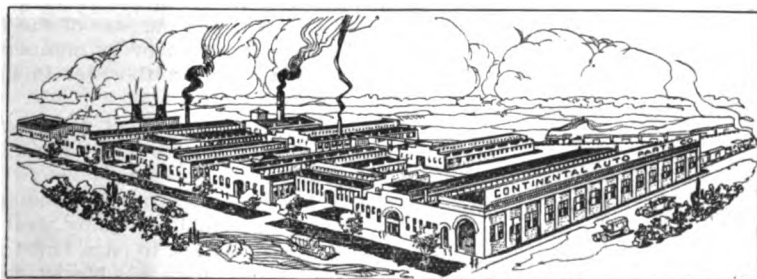
This descriptive matter covers metal hose in detail for every type and method of winding. It shows how it is applied and why, and what number of trades or industries use it. Being illustrated fully, the descriptive matter is readily understood.

It is dedicated to the engineers, mechanical superintendents, factory managers, purchasing agents and students of mechanics, as it presents technical information and furnishes the solution of many puzzling engineering problems. There is hardly an industry which does not use flexible metal hose in some form, either bare, covered or reinforced.

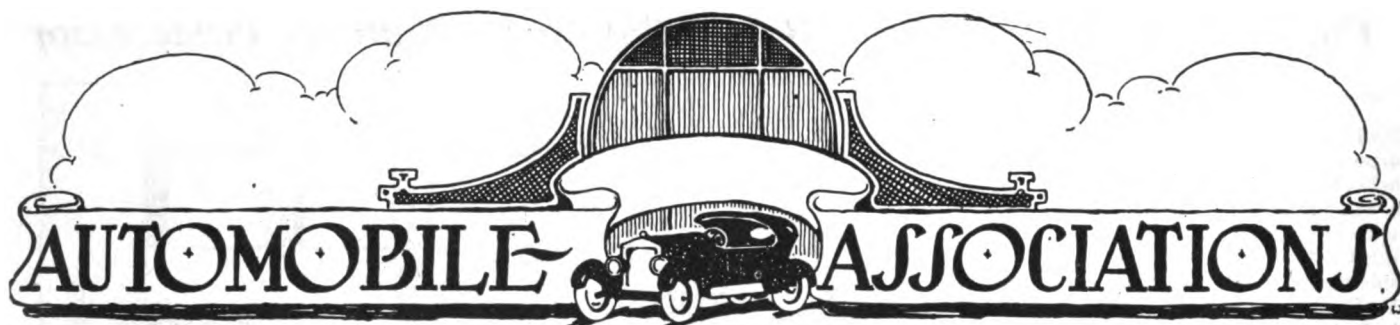
Being an expensive reproduction, Breeze will mail a copy only upon request on a business letter head or will present it through a representative.

Flexible metal hose in itself is very little understood from the standpoint of application. There are so many varied characters of winding that the Breeze company takes the stand the purchaser should be informed as fully as possible before purchasing as to what each type will accomplish.

The Breeze book furnishes all the information to be desired.



New Plant of Continental Auto Parts Co. at Columbus, Ind.



Advertising Signs To Be Removed

The New York State Motor Federation has approved the announced intention of Frederick S. Greene, state highway commissioner, to have all advertising signs removed from the highways of the state. There is a law which gives the commissioner power to remove such signs. Automobile club direction signs will not be included in any order that is given, for these are considered necessary to the guidance of the touring motorist.

The Poughkeepsie Automobile Club has been admitted to the New York State Motor Federation, favorable action on its application having been taken at the recent quarterly meeting of the directors of the federation at Watertown. The federation now has active clubs at Buffalo, Rochester, Syracuse, Utica, Albany, Poughkeepsie and New York, thus covering the entire route from the Great Lakes to New York City. Each of these clubs maintains a touring bureau and headquarters the year round for the benefit of motorists.

The New Westminster Automobile Association, Canada, has entered upon its ninth year with fair prospect of becoming numerically representative of the 4000 motorists who are registered for New Westminster and the Fraser Valley, and thoroughly representative of the city and neighboring communities. A marked feature of the enrollment of new members during the last six months has been the large number of motorists from the districts tributary to the Royal City who have joined the association and thereby have lent the weight of their influence to the demands that have been sanely and consistently made by organized automobile owners for improvement of the highways of the province.

The American Automobile Association announces that reciprocal relations will be arranged with the Automobile Club of Uruguay as a result of a conference at the national headquarters of the A. A. A. between its president, David Jameson, and the duly accredited delegate of the Uruguayan organization, Mateo A. Frugoni, who also brought with him the credentials of the Uruguayan government itself. Mr. Frugoni, in suggesting an understanding between the A. C. of Uruguay and the A. A. A., predicted that there was bound to be an increasing exchange of motorist visitors by the United States and the South American countries, and particularly the one which he represented. Mr. Frugoni suggested that the

CLUBS SHOULD AID IN ANTI-THEFT CAMPAIGN.

Every automobile association and club in the United States should join in the vigorous crusade now being waged against the automobile thief. By concerted action legislation may be brought about that will make the stealing of motor cars such a dangerous undertaking that the number of thefts will be greatly reduced. It is the duty of every club to do its part in this campaign, which is now nation wide.

reciprocal arrangements be such that the Automobile Club of Uruguay would be appointed the sole representative of the A. A. A. in his country and the American Automobile Association would be the sole representative of the A. C. U. in this country. Any member of the A. A. A. in Uruguay will be granted the same rights as those given to A. C. U. in the United States. The A. C. of Uruguay was founded June 12, 1918, its object encompassing the protection of the interests of the automobile owners, and to help the government, morally and materially, in the construction of the roads.

The New York State Motor Association has completed its plans for the annual convention to be held in Albany, Oct. 6 and 7. It is planned to make this the biggest annual convention in the history of the association. It is expected that upwards of 1000 motorists from all parts of the state will be present. Gov. Smith will be guest of honor at the banquet at the Ten Eyck Hotel the first evening. Others will include prominent legislators, state officials and authorities on automobile touring. Elaborate arrangements are being made for the entertainment of the ladies. Mrs. Alfred E. Smith, wife of the governor, will welcome the delegates at the executive mansion on the first afternoon of the convention. A tour of the state buildings will be arranged. The delegates will be received by President George D. Babbitt of the Albany Automobile Club and welcomed by Mayor Watt on Monday morning, Oct. 6. The business of the convention will be transacted Monday afternoon and Tuesday morning, when the election of officers will take place.

Arkansas Motorists In Association

The Arkansas Automobile Association was formed at a luncheon at the Hotel Marion, Little Rock, Ark. The following were elected officers: President, A. C. Rempel; vice president, S. C. Poage; secretary, A. W. Parke; treasurer, A. J. Wilson. Steps were taken to organize county associations, which will be affiliated with the state body. Circuit Judge J. W. Wade discussed car thefts and corrective measures. Municipal Judge Harry Hale told of his court experiences with automobile thieves. Abner McGehee, deputy prosecuting attorney, outlined proposed amendments to existing laws to reach the criminals. He consented to draft desirable legislation for the next Legislature. The constitution of the new association provides that 10 automobile owners in any county may secure a charter. President Rempel will immediately start a campaign in each of the counties to secure this number. Each county or city organization affiliating with the state body may elect a vice president, who will be a member of the board of directors.

The Minneapolis Automobile Club's new home, on the Minnesota river, about 15 miles from Ft. Snelling, was formally opened recently. Covers were laid for 300 at the 7 o'clock dinner and with those who came later for the dancing the guests totaled about 500. Nearly 150 cars carried visitors from Minneapolis. One of the features of the club, designed by Francisco Scotti of Paris, is a grotto where a waterfall of artificial rock construction is illuminated by colored lights.

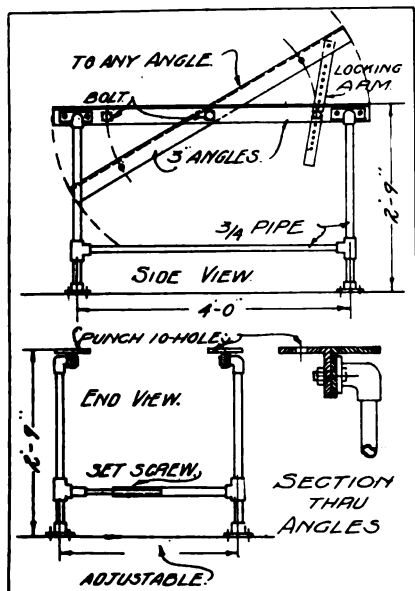
The Motor Club of Lackawanna County, Pa., is co-operating with the authorities in the enforcement of the automobile regulations. A recent announcement by Secretary William A. Jensen states: "We sincerely hope that every member of the motor club will observe the road rules of the state and report to the police department or the secretary any violations, as it is the purpose of the Motor club to co-operate in every manner with the city and state authorities in enforcing the laws."

The Automobile Club of America notifies motorists going to Newark from New York that Third street in Weehawken is now a one-way street for eastbound traffic only. Automobilists going west from the ferry are advised to pass Third street and continue on for eight blocks, then go west on Union street to the Hudson County Boulevard.

HOME-MADE ENGINE STAND.

An engine stand that may be made in a few hours time by any mechanic or garage repairer from water pipe and four lengths of angle steel will prove as serviceable for use as any stand that may be purchased, and it is constructed in such a manner that any size engine may be handled upon it and the work done from many angles.

The stand is constructed from three-quarter or one-inch gas or water pipe and the necessary fittings for the uprights and cross members. Floor flanges being used at the tops and bottoms of the uprights for the stand to rest on at the floor and the angle iron lengths are fast-



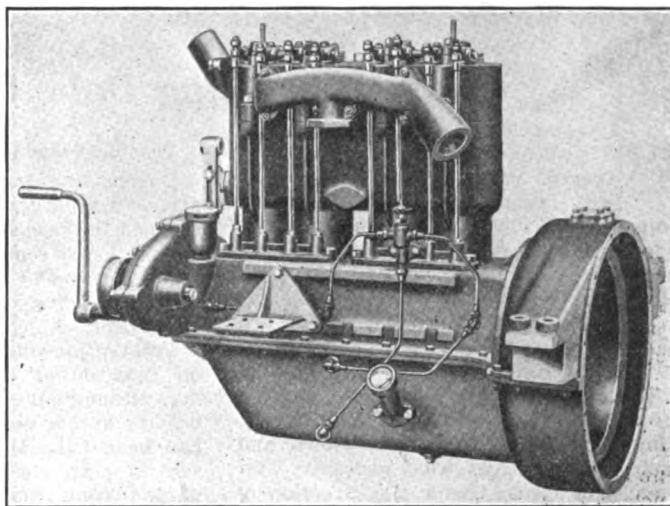
ened to the tops of the uprights. The height of the stand is 33 inches from the floor, which brings the engine to about the proper height for the repairer to work. This height may be varied in building the stand to convenience the repairer, but 33 inches has been found to be the average height required in most shops.

The four angle iron members are about four feet six inches length and as will be seen from the diagram, two are bolted together to form a side. Holes are bored in the ends of the inside angle iron strip so that engines having base or arm holes in different locations may be bolted to the angle iron bed and held securely. Most any size bolt may be slipped through the holes while work is done upon the engine, so long as they hold securely. The stand is made wider or narrower by adjusting the cross members at the ends. A set screw is fitted to the longer length of pipe and is seated against a short steel or iron rod fastened securely by welding or otherwise to the short length of pipe extending from the fitting in the upright. This rod is such a length that quite a range of adjustment is obtained, so the stand may be used for varying width of bases.

With this stand by removing the end bolts in the angle iron bed the engine and stand may be tilted to any angle desired for work. This is possible as the center bolts allow the inside angle strips

NEW GRAY "VICTORY MOTOR"

A SMALL heavy duty type engine, which is claimed by the maker to be equally well adapted for car, truck and tractor propulsion, is now being produced by the Gray Motor Co., Detroit, and is known as the "Victory Motor." The engine is unusually accessible, and all moving parts are protected against the influence of abrasives. It is a four-cylinder, water cooled, four-cycle, vertical, I head type, $3\frac{1}{2} \times 5$, the S. A. E. formula giving 19.60 horsepower and the maker claiming 34.60 horsepower at 1900 revolutions per minute. The cylinders are cast en bloc with the water jacket and the upper half of the crankcase integral from a high grade of seasoned gray iron, and the cylinder block head is a separate unit. In reality the engine is four sections, the valve



Left or Valve Side of "Victory Motor" with Rocker Arm Cover Removed.

cover, the cylinder block head, the cylinder block and upper section of the crankcase and the lower crankcase section. The design of the block head is unusual in that it is so cored for two intake passages that there are two "hot spots" that are intended to heat the fuel gas and produce high efficiency and economy.

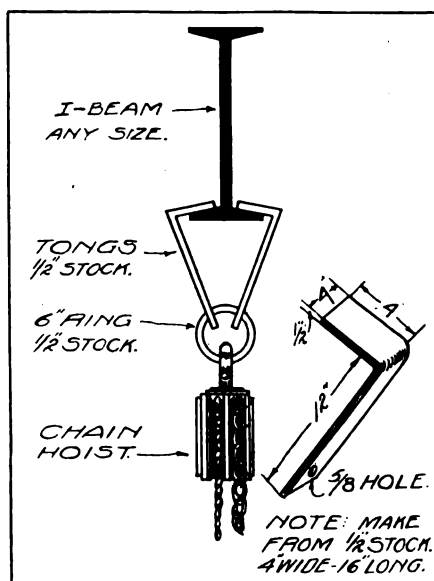
to turn free from the outer strips and when turned are held in any position by a strap fastened to one of the end bolts, having a series of holes drilled in it, spaced an equal distance apart. The edges of the angle iron strips should be beveled so that the repairer will not catch his clothes and tear them.

With a little forethought a nice piece of work can be made in constructing a stand of this type and considering the small cost for the material and the labor of assembling will more than repay the shop owner building it.

All of the pipe and fittings are threaded and are used without any change. The four fittings at the tops of the uprights, to which are secured the angle

iron strips, are the same as are used for the feet of the uprights. These may be purchased at any plumber's supply house and are known as flanges. The only difference in them is that when used at the tops the sides are ground off, leaving a strip about two inches wide with two holes for fastening them to the angle iron members. The bolts used should fit flush inside of the angle iron and the holes for the bolts should be countersunk to have flat surfaces for the inside angle iron members to pass without binding.

HOOK FOR CHAIN FALL.



Hook for Chain Fall.

A device for holding chain fall for lifting engines from the frame of a car that may be easily made by any blacksmith in a few minutes time will save its price many times in regular work. In some repair shops a crane is not used because of lack of room and resort is made to some other method of hoist that is usually not satisfactory.

This device is adapted for use in a garage having steel girders or I beams overhead and consists of two hooks and a ring. The hooks are about four inches wide and of one-half inch stock, tapering slightly at the lower end and having a five-eighths inch hole drilled or punched at this point. The ring, which is the same size or a trifle smaller is about six inches in diameter and passes through the holes of the two hooks. In use the hooks are slipped over the edge of an I beam and the chain fall attached. The weight of the fall keeps the hooks in place on the beam and when they are attached to the engine to be lifted they hold still more firmly.

AUTHENTIC TRACTOR OPERATING RECORDS

Wheat on 127 Acres Harvested and Threshed and the Same Area Plowed and Partly Disced, with Everything Done Under Careful Observation

FIRST authentic tractor operating records were obtained by the Parrett Tractor Co., Chicago, in a recent test in which wheat on 127 acres was harvested and threshed and the same area plowed and partly discd under careful observation, with the crew selected to average with farm labor. The test took place on the Cowskin Valley farm at Oatville, Kan.

Three Parrett tractors were sent to the farm with mowing and binding machines, mouldboard and disc plows, and such equipment as was necessary for their operation. Under the direction of Prof. F. F. Frazier, professor of civil engineering at the Kansas State Agricultural College at Manhattan, a system of record was followed which necessitated observation of every minute of work done, the reason for every stop and its duration, and the weighing of all fuel and lubricants.

The regular force of men, including operators, cooks, etc., was about 15, but

Tractor Plowing the Hardest Work.

Discing the land was begun nights after threshing for the day had been stopped because of the toughness of the grain, but because of the condition of the soil only 34.3 acres were worked, the operation being ended at the request of the owner.

Tractor plowing was simpler to carry on than either the mowing or threshing, although the soil dried rapidly and became harder every hour after the grain had been cut. During the plowing nine sets of plow shares were used. As regarded from the viewpoint of tractor service the plowing was the hardest of all the work of the trial because it was continued day and night, but the data sheets show that the combination of plow and tractor was best of all. In this connection statement should be made that during the plowing the tractor averaged an acre an hour, which is its rated capacity.

Compilation of the record presents

fact that the standard farm tractor, or at least this make, will afford dependable service at surprisingly small upkeep and operating expense, provided, of course, that it is given care.

The work done did not cause disproportionate depreciation from use, for after the test according to the language of the observer, the "field work could have been continued without any adjustments to the tractor."

The following facts from the records are of special interest and can be studied profitably by any tractor manufacturer, salesman, dealer or farm owner.

HARVESTING WHEAT.

	Time	
	H	M
Duration of harvesting.....	72	12
Time lost, binder trouble.....	14	23
Time lost, adjustment special steering attachment.....	00	34
Time lost, driver's negligence	00	38
Miscellaneous stops, taking photos, adjusting lights, etc.	2	58
Time lost, tractor faults, broken fan belt, repairing carburetor leak, etc.....	00	44½
Actual cutting time.....	52	54½
Acres harvested an hour, using one eight-foot binder..	2.4 acres	

Fuel, Lubricant and Water Consumption and Cost.

Kerosene used harvesting..	1.11	\$0.136
(a) Lubricating oil.....	0.0084	0.009
Based on difference between quantity put in and quantity drained out.		
(b) Based on total Veelol oil put into crankcase.	0.033	0.036
Air washer water used.....	0.073	
Radiator water used.....	0.024	
Total cost, fuel and oil (a)		0.145
Total cost, fuel and oil (b)		0.172
Cost of oil figured on basis of \$1.10 a gallon and kerosene at 12½ cents a gallon.		

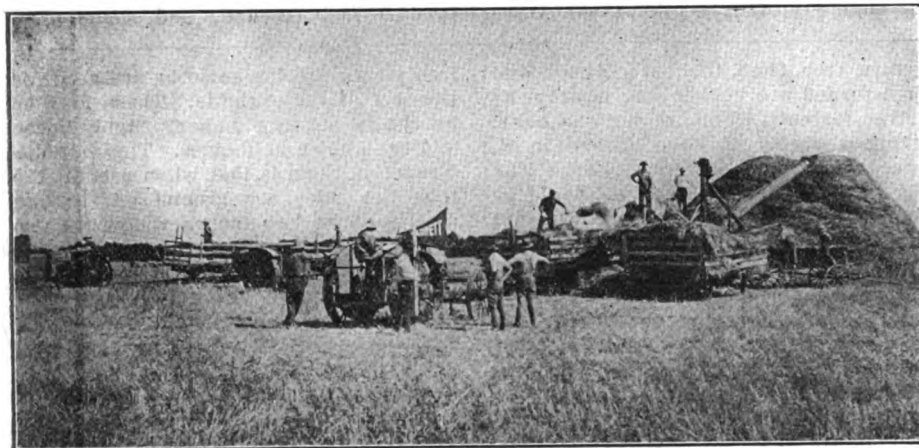
THRESHING.

Using an Aultman & Taylor 23 by 36 inch separator equipped with automatic feeder, stacker and weigher and hand-capped by lack of field labor.

	Time	
	H	M
Duration of threshing.....	71	57
Time lost, miscellaneous stops, taking photos, adjusting lights, etc.....	4	44½
Time lost, separator trouble.....	5	02
Time lost, tractor trouble, changing spark plugs, tightening fan belt, etc.....	1	08
Actual threshing time.....	61	02½
Acres threshed an hour.....	2.08 acres	

Fuel, Lubricant and Water Consumption and Cost.

	Gallons an acre	Cost
Kerosene used threshing..	1.07	\$0.135
(a) Lubricating oil.		
Based on difference between quantity put in and quantity drained out.....		
(b) Based on total Veelol oil put into crankcase.	0.0075	0.0082
(b) Based on total Veelol oil put into crankcase.	0.067	0.073
Air washer water used.....	0.104	
Radiator water used.....	0.375	
Total cost, fuel and oil (a)		0.1432
Total cost, fuel and oil (b)		0.208



Threshing the Grain Crop with Tractor Power, the Bundles Being Hauled to the Thresher with Three Teams of a Tractor and Two Wagons Each.

part of the time more than 20 were engaged. The crew was organized to obtain practical efficiency, there being four shifts of operators and observers to cover each of the 24 hours of the day.

The tractor drivers were chosen carefully, not so much for their experience or technical knowledge, but to average up to what could be expected of farmer operators. For this reason a 16-year-old boy, a resident of Wichita, was one of the regular drivers. He had never seen a Parrett tractor and knew nothing more about it than he was taught in two days. Outside of one or two experts, the other men were of average experience.

More than 60 per cent. of the time lost during the harvesting was due to operating failure of the binder from various causes. It is believed that this loss could be very largely reduced by study of the causes and means for preventing them.

some extremely interesting facts—information that is especially desirable for those engaged in farming—which could only be obtained by accounting the time and expense of definite work.

Tractor Efficiency Depends on Driver.

Another fact established was that the efficiency of the tractor from an operating point of view was dependent in no small measure upon the driver. This is not meant to imply that the driver should be an expert, but to emphasize that an operator will become careless and neglect attention that, should it have been given, would have obviated failures and delays that necessarily prolong the work and increase the expense.

Statement is made that nearly all of the causes of delay of the tractor were directly traceable to the negligence of the driver and could have been prevented by the care that is known to be necessary. The main result obtained is the



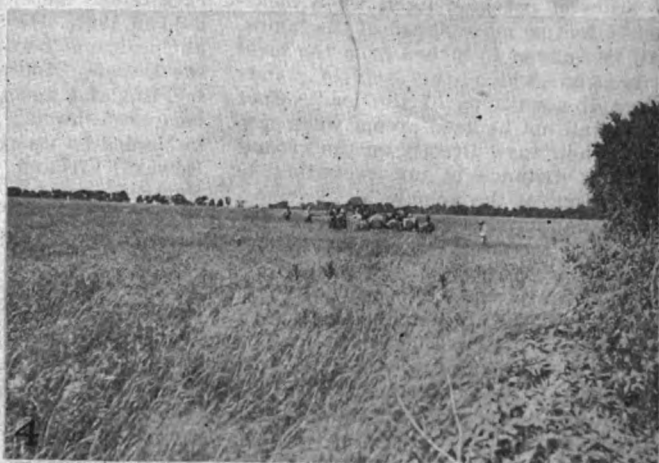
1



2



3



4



5



6



7



8

Scenes of the Parrett Tractor Test: 1, Headquarters of the Crew; 2, Observer Weighing the Fuel and Oil; 3, Prof. F. F. Frazier, Official Observer, Weighing Fuel; 4, Start of the Test; 5, Driver Operating Tractor from Seat of Binder; 6, Border of Field After Grain Was Cut; 7, General View of Wheat Field; 8, Tractor-Drawn Binder of Wheat Field.

NEW HAMPSHIRE ENFORCING LAWS ON HEADLIGHTS.

Because of the large number of automobile accidents that have occurred on New Hampshire highways at night, Commissioner Olin H. Chase has inaugurated an active campaign for enforcement of the laws against glaring headlights. The campaign will extend well into the fall and motorists planning autumn tours to the White Mountains should make sure that their headlights meet with the requirements of the New Hampshire laws. The regulations state:

"No person shall use on a motor vehicle operated on the public highways of the State of New Hampshire any lighting device of over four candlepower equipped with a reflector, unless the same be so designed, deflected or arranged that no portion of the beam of reflected light, when measured 75 feet or more ahead of the lamps, shall rise above 42 inches from the level surface on which the vehicle stands under all conditions of the load. Spot lights shall not be used except when projecting their rays directly on the ground and at a distance of not exceeding 30 feet in front of the vehicle."

The dimming law provides that the lights from the front lamps shall be sufficient to be visible at least 200 feet in the direction in which the vehicle is proceeding, and that all motor vehicles shall be equipped with some device to dim the glare or to scatter the rays of light from the same. It shall be the duty of any person having control or charge of a motor vehicle which is equipped with electric lights to dim or extinguish such headlights when approaching an electric street railway car or another motor vehicle coming in the opposite direction.

CLEANING SEAT COVERS.

Seat covers may usually be cleaned very satisfactorily with a non-alkaline soap and warm water. The best way to carry out the job is to take the covers off and give them a good scrubbing on the board.

White and Howard are Planning to Build New Car

D. McCALL WHITE and E. C. Howard, who recently resigned from high positions in a leading Detroit automobile factory, are preparing to enter the market with a new car. They have taken possession of a large modern plant in Indianapolis, which they recently purchased from the bondholders of the Stenotype company. With more than 150,000 square feet of floor space immediately available, they are prepared to go ahead rapidly, after the design is thoroughly tested and approved.

Mr. White, a native of Glasgow, Scotland, and a student of the Royal Technical College there, entered the motor car field in 1902. He rose rapidly to important positions, becoming chief engineer of the Daimler Motor Car Co., Ltd., Coventry, England, and general manager of the company's branch in Naples, Italy. While in Naples he was the companion of King Edward VII and Queen Alexandra of England on various automobile trips. Upon his return from Italy Mr. White became chief engineer and works manager for Napier & Son, Ltd. The Napier of Mr. White's design held the world's speed record.

He came to the United States in 1914 and associated himself with the Cadillac Motor Car Co. He was personally responsible for the design of the Cadillac eight-cylinder car, which created such a sensation in 1914. He became chief engineer and later vice president of the Cadillac company.

During the war Mr. White became involved heart and soul in the design and production of the Liberty motor. He was a member of the supervisory committee of three and gained the reputation of being a man who actually got things done in a great emergency.

E. C. Howard, after leaving the National Cash Register organization, entered the sales department of the Cadillac

Motor Car Co., rising to the position of general sales manager. He was an important member of the Cadillac organization for 12 years and his name is familiar among the motor car distributors the country over.

The type of car and the name of the company have not been made known. An inkling may be gained, however, from a statement by Mr. Howard. "The war," he says, "with all of its intense engineering experiences is behind us. We learned many valuable lessons in the design and construction of automotive machinery. In England and France some of these lessons have already influenced the design of certain motor cars. In America we expect to be among the first, if not the first, to give the public the benefit of these marvelous advances in design."

MILLER'S FOREIGN ORDERS.

Evidence of the desire of the foreign customer to own American goods is shown in the unusual export activities of Charles E. Miller, the big accessory jobber. This concern has within the last few weeks received a number of big orders for the export of automobile accessories to almost all parts of the world.

Mr. Miller has one banker's unrevokable credit for \$50,000 as an initial deposit for an order that will run far in excess of this amount and a number of orders that will run as high as \$15,000. Some of these are also backed by bankers' unrevokable credit.

This is more evidence to prove that the government should lend the American jobbers and manufacturers all possible cooperation for the development of foreign markets.

DRAWING OF SPACES FOR NATIONAL SHOWS OCT. 2.

As the date for the allotment of space for the National Automobile Shows approaches, interest in the forthcoming expositions is growing throughout the industry. Truly post-war displays and reflecting the general demand for motor vehicles, the motor expositions at New York and Chicago promise to establish new records from the standpoint of not only the number of exhibitors, but as well as mediums for demonstrating the marked advancement in the development of automotive engineering.

Applications for space at the two gigantic national shows are now being received at the headquarters of the National Automobile Chamber of Commerce, under whose auspices those events are to be conducted. To receive consideration on the date of space drawing, applications must be received by the N. A. C. C. at 7 E. 42nd street, New York, by midnight of Sept. 27. Drawing for space will take place at this address on Oct. 2 with the members of the N. A. C. C., representing both truck and passenger car products, having first choice in the drawing. After the requirements of the members have been provided for, other concerns whose applications have been filed will have space allotted to them.

HOTEL EMPIRE

Broadway at 63rd Street
NEW YORK CITY

Room, use of Bath	\$1.25	Room with Bath	\$2.00
Parlor, bedroom and bath,		\$3.00	

Add to the above rates, 50c. for each additional person.

All Surface Cars and Fifth Avenue Busses pass the door.
Subway and "L" stations—two minutes.

Beautiful Central Park—One block.
OUR RESTAURANT is noted for its excellent food and moderate prices.
P. V. LAND, Manager.

Centrally
Located

Near all the Famous
Shops and Theatres





FORD ENGINE TROUBLE.

(H. T. D., Waterloo, Ia.)

Please state the cause following conditions of my Ford engine, model 1917. If throttled down to eight miles an hour or less it jumps as if one or two cylinders were missing. It also backfires badly in the muffler. I have tried regulating the mixture without much success. My cylinders and plugs are clean and free from carbon; the magneto, coils and wires in apparently good condition and the adjustment seems to be perfect. What would you advise?

Two things may be the cause. One is the lack of oil on the small roll in the timer. A need of oil there will cause a Ford engine to function as you mention. The second cause and the most likely one is that your exhaust valves are not properly seating. Better find out which cylinders are back-firing and have the exhaust valves on those cylinders ground. There is small chance that the cylinders are firing in the wrong order as the wires are cut the right lengths to fit between the dash and plugs, so it is hardly possible that the cause of trouble could be in the connections. The primary wires could be connected in the wrong order at the commutator, and it might be well to examine them and see if the connections are correct.

LUBRICANTS FOR FORD CARS.

(G. R. McG., Woonsocket, R. I.)

I have a new Ford car and I am putting new leather boots on the steering gear connections to protect them from dust and dirt. Can I pack them with cup grease or will oil be best for the new connections? What is the best lubricant for the differential and transmission? When using reverse pedal it sticks and will not release. What is the cause and adjustment necessary?

Use cup grease for the new boots as any fluid oil would work out in a short time. A gear grease or gear compound should be used in the differential, as it hangs to the faces of the gears better than a clear grease. Steam cylinder oil is also good, but the cost is slightly higher than gear compound.

The transmission is oiled from the engine base and does not require separate oiling. Remove the transmission case cover and learn if the spring is broken or the bevel on the reverse band is rough. The rod through the side of the case may have too tight a bearing. Apply oil to the bearing on the outside and work the pedal a few times till it moves freely.

HOW TO TELL WHEN GENERATOR IS CHARGING.

(S. D. F., Rochester, N. Y.)

Please inform me how I can tell if the generator of my car is generating current or not; also how to remedy the oil working up through one of the spark plugs?

The ammeter should show charge or discharge. If not provided with an ammeter or if the needle does not move, run the engine and disconnect one of the generator wires and see if a spark is made there. If the battery does not charge the generator may not be working, although this also would be caused by dirty commutator brushes, by a poor contact on some wire or if the connections to the dash are loose. The oil flood at the spark plug is caused by the plug not being properly tightened or it may be a poor plug. Either put in a new plug or tighten the one you now have.

(When Writing to Advertisers, Please Mention the Automobile Journal.)

HOW TO DETERMINE THE POLARITY OF BATTERY.

(W. A. D., Bronx, N. Y.)

I have a new storage battery and am unable to determine which is the positive and negative pole. Will you kindly tell me through the columns of the Journal?

Every new storage battery as it comes from the manufacturer should have the symbols positive (+) and negative (—) stamped on the terminals of the battery.

You should find these symbols stamped on the terminals of your battery. If you do not then you can determine the polarity by test. The simplest method of all is by a voltmeter, but if an instrument is not at hand, dip the ends of wires leading from the terminals of the battery into a tumbler of water in which has been dissolved a teaspoonful of ordinary table salt, a couple of tablespoonfuls of vinegar, or a small quantity of battery electrolyte, care being taken to keep the wires at least an inch apart. As the current flows through the wires and the water, the greatest number of air bubbles will be given off by the negative wire.

Pole finding paper can be obtained which will show one color for negative and another for positive. The skin of a potato will show polarity if the wires are held upon it slightly separated. The positive contact will show a green color.

HIS FORD CLUTCH SLIPS.

(G. D. A., Springfield, Mass.)

Having subscribed to the Automobile Journal I would like to take advantage of the Reader's Department. I have a model T Ford car. Recently I have noticed that when climbing grades the motor has a tendency to race, but does not transmit the power to the rear wheels. To the contrary, the speed of the car is decreased.

No doubt the cause of your trouble is that the high speed clutch slips. The adjustment is simple and can be made at home without the services of a professional mechanic. With the motor inoperative and the emergency lever moved forward to its maximum position, remove the front floorboard and transmission cover and the working mechanism will be exposed, as shown in the accompanying illustration. Directly in front of the clutch spring you will see three clutch fingers.

Each has a cotter pin extending through it, and a set screw. By removing these pins the set screws will be unlocked. Give each screw about a half turn and then replace the cotter pins and test the action of the clutch. If it still has a tendency to slip under load, give the screws another half turn. It is important that each set screw be given the same number of turns to insure the proper clutch action. Be sure to spread the ends of the cotter pins so that they cannot work out.

Tarvia

**PREVENTS DUST
PRESERVES ROADS**

Booklets on Request

THE BARRETT COMPANY

New York Chicago Philadelphia Boston
St. Louis Cleveland Cincinnati
Pittsburgh Detroit Birmingham Kansas City
Minneapolis Nashville Salt Lake City Seattle Peoria



SPECIAL SALE—AUTO TIRES

GUARANTEED 4000 MILES

If a tire fails to give service of 4000 miles we will replace it with another tire for $\frac{1}{2}$ price marked below:

Size	Plain	Non-Skid	Tube
28x3	\$6.45	\$7.45	\$2.30
30x3	7.45	8.35	2.15
30x3 $\frac{1}{2}$	8.95	9.95	2.40
31x3 $\frac{1}{2}$	9.45	10.45	2.45
32x3 $\frac{1}{2}$	9.95	10.90	2.50
34x3 $\frac{1}{2}$	10.45	11.30	2.80
31x4	13.45	14.60	3.20
32x4	13.95	14.95	3.30
33x4	14.45	15.45	3.35



Size	Plain	Non-Skid	Tube
34x4	\$14.95	\$15.95	\$3.45
35x4	15.45	16.95	3.55
36x4	15.95	17.50	3.60
34x4 $\frac{1}{2}$	18.45	20.45	4.30
35x4 $\frac{1}{2}$	18.95	20.95	4.40
36x4 $\frac{1}{2}$	19.45	21.45	4.45
37x4 $\frac{1}{2}$	19.95	21.95	4.50
35x5	20.95	23.45	5.15
37x5	21.95	24.75	5.30

Deduct 2 Per Cent. When Check or Cash Accompanies Order.

10% Deposit Required on All C. O. D. Orders.

We Carry a Full Line of New and Reconstructed Tires.

ATLAS TIRE COMPANY,

Tires and Tubes Shipped
Express Prepaid

Telephone Poplar 2970

822 BROAD STREET, PHILADELPHIA, PA.

CLUTCH GRABS ON CHEVROLET.

(G. W., Buffalo, N. Y.)

I have a 1915 Chevrolet car and lately the clutch is giving me trouble. When I throw it in it jerks. I have oiled the clutch three times, but this does not seem to do any good. Please let me know the trouble and what I should do?

The clutch as used on this car is a leather faced cone type. The "grabbing" of the clutch or "seizing" may be due to the facing material being so worn, frayed or burned in spots that it is no longer possible for this unit to transmit the power from the engine to the driving wheels. Also, your clutch expander may be adjusted unevenly, or extreme dryness may be the cause. Suggest first that a careful examination be made.

If the facing is badly worn it should be replaced with a new one, which may be obtained from the Chevrolet service station. In removing the clutch facing and drum, first disconnect and remove the rear axle, transmission and clutch collar. Then turn the flywheel until the hole passing through the clutch hub is exposed and with a punch or drift remove the clutch spring retaining pin. The clutch drum will then be free and it may be taken from the flywheel. In replacing the facing be very careful to drive the rivet heads below the facing surface.

If the leather or facing is not badly worn it may be cleaned with kerosene. After the facing has been cleaned from grease or grit, apply evenly with a brush, swab or feather, castor or neat's foot oil to soften it.

After the leather has been cleaned and oiled, if the clutch still continues to grab, the leather expanders should be adjusted. Within the clutch drum you will observe six projections, inside of which are springs, and on top of these are nuts. These projections are known as clutch expanders and are little plunger devices, which in turn press upon the leather surface, raising it higher at the six points so that the engagement is gradual.

In adjusting the expanders turn each of the expander nuts

to the right until they lightly touch the clips, then give them a half turn to the left so as to allow proper expander action under the leather. If this does not remedy the trouble it may be that the expander springs are too weak. If this is the case these springs should be replaced with new ones from the factory.

ADJUSTING A REMY MAGNETO.

(E. T. R., Cleveland, O.)

I have a Remy magneto. My spark lever is only effective when advanced about one-fourth of the distance, and that point seems to be the only place where the engine works well. When the car runs at 25 miles an hour the engine seems to be laboring. It does not seem to have the power it should have.

The Remy magneto as constructed for cars before the use of engine starters is a low-tension type, having a coil to transform the current to a higher voltage at the plugs. The timer and distributor are located on the end of the magneto. The adjustment of the breaker points is very simple and is made with a knurled nut on the inside of the magneto timer case that can be screwed in or out as required. On the end of this screw is a platinum point which makes contact with a stationary platinum point on the breaker arm. In such a case as the writer describes, screwing in the adjusting screw will usually make an adjustment that will give a higher spark at the wheel. If this adjustment is not sufficient at the first trial it can be tested by advancing the spark lever with the engine running and listening to the exhaust. If the engine skips on one or more of its cylinders it will prove that the setting of the screw is not correct. Screwing it in further will change this, unless the points are burned, in which case the adjusting screw should be replaced. The fact that the engine labors at 25 miles an hour would show that it is quite badly worn and needs overhauling and all worn parts replaced. Grinding the valves may help for a time.

(When Writing to Advertisers, Please Mention the Automobile Journal.)

MAGNETO AND GENERATOR.

(E. H. Linwood, Mass.)

What is the difference between a magneto and a generator? Is it possible to run a Grant or Studebaker car without a storage battery?

A magneto is a small machine that will produce or generate a current sufficient for automobile or internal explosion engine combustion, or for any other purpose where a very low amperage and high voltage current is required. The magneto of the Ford chassis is larger than other types and for this reason may be used for lighting. Magnetos are either low-tension, with which a separate coil is used to intensify the current to the desired voltage, or high-tension, in which type a coil is included in the instrument. With either type of machine a circuit or contact breaker must be used to interrupt the current to obtain ignition, and a distributor that will distribute it to the engine cylinders in the order of firing.

A generator is a larger machine than a magneto, primarily intended to generate current, either direct or alternating, according to the design. The direct current generator is used for charging secondary (storage) batteries. The alternating current must be rectified (converted to direct current) if used for this purpose. A generator is driven mechanically, and may be said to be a machine for converting mechanical energy into electrical energy. This means that the current is taken from the machine. Obviously no transformer coil, circuit breaker or distributor are used with it. Any generator can be used as a motor if the current is sent through it instead of being taken from it. Usually a test for generators is to drive them as motors, and a test for motors is to drive them as generators.

Both the Grant and Studebaker cars are equipped with Wagner starting and lighting systems, and with Remy ignition systems. The generator charges a Willard battery, from which current is drawn for lighting, starting and ignition. Obviously neither make of car can be driven without a battery unless further equipped with another ignition system.

GENERATOR DOES NOT PRODUCE CURRENT.

(F. C., Troy, N. Y.)

The Wagner generator on my car will not generate current. Have taken it apart and tested the armature, finding it free from grounds or open circuits. Have cut down the mica insulation between the copper segments of the commutator and find that the commutator is in good condition. Have tested the fields for open circuit and find that they are all right. The spring tension on the brushes is correct and holds them against the commutator evenly. Have disconnected the wires from the generator and made an ammeter test and feel sure that it is not caused by the cut-out or an outside line. Kindly advise me through the Automobile Journal what you think may be the cause of the generator not producing current and the reasons for it?

There is reason to believe the cause is in the commutator where the leads from the coils are soldered to the segments. The armature of your generator at some time has probably been overheated and this overheating has loosened the soldered connections. It is difficult to see this with the naked eye and it cannot be determined by ordinary testing as current enough will flow through these connections to show perfect indications during a test. This fact can only be determined by what is known as a "millimeter" test and is very accurate. If a lamp should be used for the test it will be found that on all of the tests given that the lamp will glow, leading the tester to believe that the coils are perfect. By using a voltmeter for the test practically the same results are obtained as with the lamp.

By using a millimeter for the test the repairer will be shown that where now and then a coil will give a fairly high reading, that the majority of the coils in the armature will give very low readings as, for instance, one coil will show a reading of five, another seven, another 10 and so on, very few of the coil readings being alike, though all of the readings should agree.

As the resoldering of these connections is a very delicate operation and should be done by one thoroughly familiar with this class of work, the wisest course and the one that is

(When Writing to Advertisers, Please Mention the Automobile Journal.)

THE MOTALARM**Insures to You***High Engine Efficiency**Large Fuel Economy**Adequate Lubricity**Minimum Fuel Consumption**Lessened Repair Cost**Maximum Power**Fullest Flexibility**Driving Satisfaction***It Warns You**

By a shrill whistle when the water of the cooling system becomes low, yet when there is sufficient to drive 30 miles.

It Never Fails

And requires no attention. Mounted on the radiator cap, it adds to the appearance of any car.

Price \$3.00*at all dealers or direct.*

Dealers: The Motalarm is a constant seller. The profits are very attractive. Territorial allotments are now being made in the order of application.

Write for sales proposition today.

THE MOTALARM CORPORATION**1777 Broadway,****New York**



*All That Its
Name Implies—*

THE HEIGHT OF PERFECTION

You cannot secure more efficient and economical carburetion than by the Zenith. Simplest to adjust, and once adjusted stays adjusted.

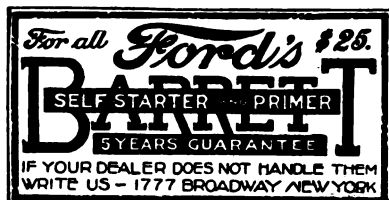
Known the world over as the

ZENITH OF CARBURETOR EFFICIENCY

A long list of American builders of cars, trucks and aeroplanes believe this simple, plain tube device to be the best insurance for permanent carburetor satisfaction.

Zenith Carburetor Co.

New York Detroit, U. S. A. Chicago



METZ Master Six

The car of the Year

A New England Product

Honest through and through

\$1695 F. O. B. factory FULLY EQUIPPED

We are now extending our agency list
Information at request

METZ SALES CORPORATION
BOSTON, MASS.

recommended is to send the generator complete to the Wagner factory and have them do this work.

The cost should not be very great and you will be better pleased with the job when finished. If you should attempt to do this work yourself, or let some repairer who is not an expert attempt to do it, you would probably find that where the first cost might be less, in the end you would have a generator that, if it was at all serviceable, would be a source of annoyance as long as you used it, and eventually you would have to purchase a new generator, costing you considerably more than you would have to pay the factory to repair the one you now have.

CARBURETOR TROUBLES.

Many motorists do not keep in mind the fact that with a car in perfect condition mechanically and its engine satisfactorily ignited, service and economy depend mainly upon one factor—the character of the fuel mixture. A fraction of a turn on the carburetor adjustment may supply a gas with which a car may “eat up” the hills or balk on the slightest grade.

The question that every motorist should solve for himself is carburetor adjustment. If adjustment is not satisfactory at the first opportunity the car should be turned over to a repairer who has the reputation of being a first-class carburetor man and let him adjust it. Not all repair men are expert at this work, but now and then there is a man who has made carburetors a study and if you are fortunate enough to get one of this type he will be able to get results in a very short time that will please you as a driver. After your carburetor has once been set properly, leave it alone and do not allow anyone else to touch it or its adjustments unless as a last resort in tracing troubles. Carburetors as they are made do not change, unless by outside means.

The following suggestions should enable one to decide whether the mixture is too lean or too rich. One way of determining if a mixture is too rich is the smell of the exhaust. When the engine is running this may be noted by standing at the rear of the car. A strong stringent smell from the muffler establishes this. Another method is noting the condition of the spark plugs. A too rich mixture will soot the plugs very rapidly and a carbon deposit will eventually short circuit the plugs or fill them so they will not fire. It will also cause the combustion chambers of the cylinders to foul with carbon, which must be removed by burning. Low fuel economy as compared with other similar cars, irregular missing and explosions in the muffler, unusual heating of the radiator, slow acceleration and lack of normal speed or pulling power, black smoke at the exhaust and a yellow or yellow-edged flame at the cut-out, are all indications of too rich a mixture.

It is only when the mixture is greatly over-rich that some of these signs are apparent.

A lean mixture is indicated by hard starting unless fully choked, liability to stall, slowness of power development after a cold start, explosions in the intake and carburetor, inferior acceleration and pulling power with no great lack of speed on level roads, some tendency to overheat, a tendency to “labor” when heavily loaded at low speed, perfect freedom of plugs from gasoline soot and a short greenish-blue exhaust flame from the cut-out, all denote too lean a mixture.

A lean mixture is a great help at times, but must be used with moderation. On test runs sometimes with an experienced driver who knows what he has for a mixture, a large mileage can be made on a lean mixture which could not be obtained in any other way.

Occasionally an owner has the idea that he can get these results himself, but he usually comes to grief for the simple reason that he does not handle his car as would the expert driver. Neither does he favor his car where the possibilities are good for doing so.

When the proper mixture is obtained the motor will start with a full, easy motion that denotes that there are no plugs skipping, the plugs will not soot, the car will pull with a freedom on the grades that denotes full power, the fuel economy will show about normal, full power will be shown at all times and under all conditions and when the exhaust is opened the flame will show the deep purple of complete combustion.

(When Writing to Advertisers, Please Mention the Automobile Journal.)

REMOVING REAR WHEELS OF ALLEN CAR.

(G. P., South Attleboro, Mass.)

I should like to know how to fix the brake bands on my Allen roadster. I can take out the live axles, but I cannot remove the wheels to take the brake bands off. The car is a 1916 model.

Allen cars are equipped with both service and emergency brake operating on the rear wheels, the former being an external contracting and the latter an internal expanding type. The axle is three-quarter floating—that is, the wheels are mounted on single bearings installed on the outer ends of the axle housing. The axle shafts are inserted into the bores of the bevel gears of the differential gearset, the inner ends of the shafts being carried on the differential gearset bearings. On the outer ends of the drive shafts are plates that are bolted to the wheel hubs by six bolts each. Were not the plates bolted to the wheels the wheels would not revolve in a vertical plane, but would "wobble" as they turned.

You have removed the wheel hub caps, and the bolts retaining the shafts to the wheels. If you will repeat this operation you will note there is a large nut threaded on to the end of the axle housing that is seated against the bearing. This nut is retained by a pronged lock washer. If you straighten the prongs of this washer, which can be done with a heavy screw driver or a chisel, the object being to release the nut, the nut can be turned with a wrench and backed off. This done the wheel can be pulled, with the bearing, from the housing. When the wheel has been taken off the brake shoes will be exposed, they being mounted on the brake spider. The brake shoes can be disconnected from the linkage and by releasing them from the anchor studs they can be taken off for whatever work is essential. Replacing the brake shoes and wheels, bearings and shafts is merely a reversal of the process of removal.

In adjusting the brake shoes see that the linkage is connected so that there will be just sufficient clearance for the brake drums to turn without drag upon them. The correct adjustment is such that when the pedal is pushed or the hand lever pulled the brake will engage, the pressure being gradually increased, instead of engaging after a considerable movement of the pedal or lever and the engagement causing a "grab" or jolt, which is destructive of tires and unnecessarily stresses the entire vehicle.

LUBRICANT FOR MILLING CUTTERS.

An excellent lubricant for milling cutters used with a pump can be made by mixing together and boiling for about 30 minutes, $\frac{1}{4}$ pound sal soda, $\frac{1}{2}$ pint of lard oil, $\frac{1}{2}$ pint of soft soap and enough water to make 10 quarts of solution.

USE OF ALTERNATING CURRENT FOR BATTERY CHARGING.

(B. B., Oakfield, N. Y.)

We have a 115-volt alternating current. In this case would you use 115 volt lamps for the bank of 10 lamps connected in parallel? Should the positive terminal of the battery be connected with the positive side of the line, and should there be a lamp in the lamp socket where the current leaves the line for the battery? This question is prompted by an article in the Automobile Journal, December issue, page 64, with reference to charging storage batteries. The more I think about it I do not know that there is a negative and a positive line in the alternating current.

An alternating current cannot be used for charging storage batteries unless it is converted or rectified to direct current. This may be done by different methods. One means is to use a motor generator charging set, consisting of an alternating current motor that in turn drives a direct current generator that is connected with the battery through some form of rheostat by which the current is reduced to the desired voltage for charging. Another means is a converter, which will convert the current from alternating to direct.

(When Writing to Advertisers, Please Mention the Automobile Journal.)



The Hotel Wellington

7th Avenue at 55th Street

NEW YORK

Located in the center of the Automobile industry, theaters and shopping districts, conveniently reached from all steamships and railroad terminals. The beautiful Central Park is within three short blocks of the hotel.

RATES

Room with use of bath, one person.....	\$1.50 & \$2
Room with use of bath, two persons.....	2.50 & 3
Room with bath, one person.....	2.50 & 3
Room with bath, two persons.....	3.50 & 4
Parlor, bedroom and bath, 1 or 2 persons..	5.00 & 6
Parlor, bedroom and bath, three persons..	6.00 & 7
Parlor, 2 bedrooms and bath, 3 or 4 persons	7.00 & 8

Special rates can always be arranged for extended periods on contract, and rates vary with the desirability of the quarters selected, the number of people in the party and the length of stay.

Operated under the Knott Management.

S. M. EATON, Manager.

PAIGE

The Most Beautiful Car in America

A complete line
of touring and
enclosed models.

Write for Literature.

Paige-Detroit Motor Car Co.

DETROIT, MICH.



Giant Searchlight

The highest quality lowest priced lamp produced.

LIST PRICE With Mirror.....\$6.00
Without Mirror...\$5.00

CULVER-STEARN'S MFG. CO.

Worcester, Mass.
Detroit, Mich.

The Automobile Journal

A QUALITY MAGAZINE, WITH PRESTIGE AND CIRCULATION THAT BRINGS RESULTS TO ADVERTISERS

TIMES BUILDING :: PAWTUCKET, R. I.



Always Up In Front

National ZIG ZAG Radiators are foremost in performance as well as in physical location.

Their unusual expansion and contraction flexibility—increased circulation—greater cooling capacity are results of a scientific principle, practically applied.

Traveling further on a given amount of gasoline and oil, and never a steaming radiator are natural benefits.

From an appearance standpoint a National ZIG ZAG Radiator adds tremendously to the Looks of your car.

"Ask Your Dealer or Write Us Direct"

NATIONAL CAN COMPANY
DETROIT (Radiator Division) MICHIGAN

**FOR
FORDS**



Price, \$28.00

F. O. B. Detroit

Finished in either nickel or black enamel. Shipping weight complete, 35 pounds.

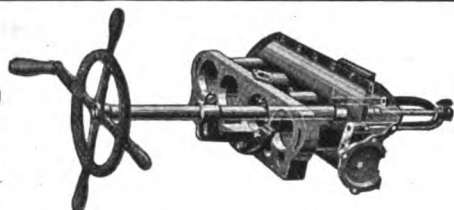
NATIONAL ZIG ZAG RADIATOR

GRANT SIX

Owners praise its operating economy in unstinted terms. 20 miles to the gallon of gasoline 900 miles to the gallon of oil and 7000 miles to the standard set of tires is the average experience.

GRANT MOTOR CAR CORPORATION, CLEVELAND

**Repairmen,
Listen!**



Patented May 19, 1914; Dec. 15, 1914; June 20, 1916; June 26, 1917.

The Heiser Improved Cylinder Reboring Tool for FORD MOTORS is the only reboring Tool in the world that is self-sharpening. It is the only tool that rebore between centers—this insures a finished cylinder, square with the crankshaft, round, straight, true and free from taper. It is adjustable and the only tool that will rebore different sizes without losing the adjustment. The best mechanic in the world can't build reputation without proper TOOLS and EQUIPMENT. THE HEISER IMPROVED CYLINDER REBORING TOOL makes good shops out of poor ones and better shops out of good ones. Write today for full particulars.

HEISER SPECIAL TOOL CO., 216 Rogers Bldg., Kingston, Mo.

and the reduction is through a rheostat. A third means is a mercury rectifier, the alternating current line being connected with the rectifier, which will convert the current into direct current, so that it may be sent out in pulsating waves, much the same as water is forced through piping with regular impulses by pumpage. There are other forms of current rectifiers, some of which are small and comparatively cheap and afford reasonably dependable results. These are in some instances mechanical and in others they are combinations.

The lamp bank resistance, which was referred to in the article in question, is comparatively simple. If, for instance, the circuit is 110, a 16 candlepower lamp will allow a half ampere to flow, a 32 candlepower lamp one ampere. If the charging rate is three amperes, for instance, three 32 candlepower lamps will allow that amperage. If the circuit is 220 volts the amperage drops to half of what it would be at 110 volts, and a 32 candlepower lamp will pass but a half ampere. The line wires are attached to a fuse block and then to a double knife switch. The switch and the fuse block are usually mounted on a panel of insulating material if the equipment is to be used continuously. One of the wires, the positive of the circuit, is run from the switch directly to the positive terminal of the storage battery. The negative wire from the switch passes to the bank of lamps. The lamps are placed in parallel connection with respect to each other, but in series connection with reference to the battery. When so coupled the current must overcome the combined resistance of the storage battery, which is very low, and that of the lamps.

The charging rate for any battery is usually shown on the name plate on the battery case. Generally there are two rates, the one marked "start" and the other "finish" or "24-hour." The starting rate is the greatest that the battery will stand and should be as great as the highest rate of the charge that can be sent through the battery. The finish rate is used when the battery is charged from an outside source of current other than the dynamo of the car. The high grade is usually from one-sixth to one-tenth of the capacity in ampere hours, generally about one-eighth. The finish rate is approximately from one-fourth to one-half of the high rate, and generally about a third. When the battery is charged from an outside source the positive side of the charging current must be attached to the positive terminal of the battery and the negative wire of the circuit to the negative terminal of the battery. The polarity of any wires can be determined by immersing the ends in water to which a small amount of salt or acid has been added. The most bubbles will be seen at the end of the negative wire.

Alternating current connected to a battery without the use of a rectifier will cause damage. With a direct current the battery may be charged by placing such resistance in the line that will allow the right amperage to flow through the cells. When a lamp bank is used as resistance the number of lamps to be inserted in the bank can always be accurately determined. The basis of determination is that with a 110-volt circuit one ampere will flow through a 32 candlepower lamp; on a 220 volt circuit one-half ampere will flow through a 32 candlepower lamp. If the lamps are marked on the bulbs, as is usually the case, with the watts required for each, a sufficient number of lamps must be used so that the watts, added together, will allow the required amperage to flow. For instance, if the circuit voltage is 110 and three amperes is desired, 110x3 is 330. This would require approximately 350 watts and seven 50-watt lamps would be necessary, or any number of lamps the combined wattage of which would approximate 350. If the lamps are marked in watts the total can be easily determined. If they are marked in candlepower a 16 candlepower lamp may be considered the equivalent of a 50 watt lamp, and a 32 candlepower lamp the equivalent of a 100 watt lamp, provided they are carbon filament, but if they are tungsten lamps the candlepower and wattage are equal—that is—a 50 candlepower lamp is a 50 watt lamp.

An alternating current has neither positive nor negative pole, for the current originates at one pole, rises from zero to maximum and subsides to zero in movement in one direction, then rises from zero to maximum and subsides to zero in movement in the other direction. The direct current moves in one direction only.

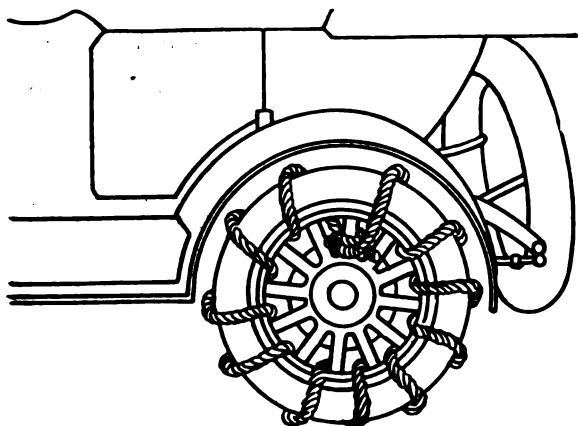
(When Writing to Advertisers, Please Mention the Automobile Journal.)

REGAINING TRACTION.

(S. F., Wyoming, Ill.)

What would you suggest to regain traction in an emergency, as when one wheel is spinning on a slippery surface and the tire chains are not at hand? My car is of the heavy touring type and is equipped with 36-inch tires on the rear.

A method which would be effective under certain conditions may not be practical under others. Frequently traction can be regained by placing small pieces of wood, burlap, etc., on the road's surface and driving the car very slowly. If a length of rope is handy, the simple, yet effective means of



Simple and Practical Way by Which to Regain Traction.

getting started, as shown in the accompanying illustration, can be employed. One end of the rope is tied to a spoke in the wheel, and the rope wound round the tire as shown. It should be remembered that the slower the car is operated, the greater will be the gripping power of the wheels on the slippery surface.

REMOVING CARBON FROM ENGINE CYLINDERS.

(W. R. B., Valdesta, Ga.)

Kindly tell me through the Automobile Journal how to keep an automobile engine clean and free from carbon by using the oxy-acetylene or some other method of burning. Have heard of these methods, but am not familiar with either. Kindly give me a description of the best and simplest method of removing carbon by the use of water or steam introduced into the engine while it is in operation. I have a few Fords equipped with 16 valve cylinder heads, purchased of the Laurel Motors Corporation, Anderson, Ind., some of them having Dixie high-tension magnetos and Van Biggle carburetors, and some with Holley carburetors. Am specifying the special equipment used so that you may be better able to advise me what apparatus I shall need that will duplicate what I already have.

Probably the best method of keeping the automobile engine exterior clean is an ordinary paint brush and about two quarts of gasoline. Remove the oil and dust occasionally with the gasoline and brush and after it has dried apply a coat of some good paint. To clean the carbon from the combustion chamber of the engine the best and cheapest method would be to remove the head and scrape off the carbon with either a knife or a putty knife. The oxy-acetylene method, while more complicated, is used to a great extent by garages frequently doing this work. If care is not used in the operation the piston heads are liable to be damaged by too much heat applied at one place. Some engines are so constructed it is necessary to remove carbon with this method, as for instance the L head and T head types, where the heads are not detachable. The outfit consists of a tank of oxygen connected through an adjustable valve that reduces the pressure to 15 or 20 pounds and the oxygen is applied through a torch with a long, rather fine, flexible delivery jet, connected with the reducing valve by a flexible tube that is fitted with a trigger valve. The delivery jet of the torch when placed in the

(When Writing to Advertisers, Please Mention the Automobile Journal.)

DODGE & FORD
DEALERS*A New Carburetor With
Undreamed of Power and Economy*THE
STOKES DUAL CARBURETORTHE SIMPLEST AND MOST EFFECTIVE
CARBURETOR IN THE WORLD

Good Opportunity For Agents

Secure Your Territory Early

*Write for information**New England Distributors*

THE V. A. NIELSEN COMPANY

708 Beacon Street,

Boston, Mass.

Phone B. B. 2969

The
Cheapest-in-the-end
Lubricant*Is the one that gives the fullest service for
the least cost per month—not per pound.*

IS cheapest in the end because it gives the fullest lubrication service throughout the year—it does not freeze or harden or melt or leak out. It does not need heat to make it start lubricating. It lessens friction, reducing gasoline consumption and repair bills.

NON-FLUID OIL actually costs less per month than common grease because it lasts three times as long.

NON-FLUID OIL is made from the finest mineral oils by our exclusive process—insist upon the orange can with our trade mark—your dealer has it.

*"K-00 Special" grade for gears
"K-000" for bearings*

*"Lubrication of the Motor Car" tells
the story—shall we send you a copy?*

New York & New Jersey Lubricant Co.

165 BROADWAY, NEW YORK

COES *The Standard WRENCH*



WRENCHES that are made for the hardest service. They do not break but grip and hold and their efficiency never lessens.

Economy tools as they last longer, give better service and never become useless through wear.

Utility wrenches of the highest order for car owners and repairers as they can be used in compact places and once set hold like a vise.

*The Best Wrench
The Cheapest*

All dealers carry in stock the exact size to meet your need. They recommend Coes Wrenches as all good dealers have for more than fifty years.

COES WRENCH COMPANY
WORCESTER, MASS.

DIXON'S GRAPHITE Transmission and Differential LUBRICANT

Put it in your transmission and differential. A quicker, easier "pick up" is at once apparent. Hills don't seem as high. Gas doesn't cost so much per mile. Repair bills decrease, and riding comfort becomes far greater. It pays.

Write for Booklet No. 210-G.

Also ask your dealer about Dixon's famous Cup Grease.

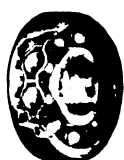
Made in Jersey City, N. J. by the
JOSEPH DIXON CRUCIBLE COMPANY
Established 1827



NEW DEPARTURE BALL BEARINGS



*Strength
Stamina
Service*



The New Departure Manufacturing Co., Bristol, Conn.
Conrad Patent Licensees

plug orifice can be manipulated so the flames can reach all parts of the combustion chamber, if slightly bent and cleverly handled by the operator. To operate the valve caps and the spark plugs of the engine are removed, the piston on the first cylinder is brought to dead center at the top and a lighted match or a piece of oily waste inserted into the combustion chamber. The operator then directs a jet of oxygen on the carbon with which the flame is in contact. This causes the carbon to burn rapidly and be entirely consumed. By following the burning carbon around the cylinder with the jet of oxygen the carbon will be evenly burned out. This method will obviate the necessity of taking cylinders off and scraping them and will make the job considerably easier and less expensive.

Carbon may be removed by scraping with hand scrapers. These may be bent in many shapes as they are made from ductile material and can be formed to reach any part. Other methods are use of chemicals which are either mixed with the gasoline or introduced through the air intake of the carburetor when the engine is running. Kerosene is used by some repairers and is injected into the air intake of the engine while it is running. It is claimed that best results are obtained by this method when the engine is warm, as the carbon is more easily removed when hot.

One thing that should be guarded against in using kerosene or any of the prepared mixtures through the air inlet of the carburetor is to keep the engine turning at a good speed, otherwise it may choke and stop, in which event starting may be difficult because of the volume of kerosene or other mixture in the engine. The use of either method is practical with your present equipment, as the operation could be done through the spark plug openings of the carburetor.

There are various devices in the market for injecting water through the manifold for softening and removing carbon. Some inject cold water and others water that has been slightly warmed by passing the connecting pipe around the exhaust manifold. These devices will probably do all the manufacturers claim, but probably the better method is to free the cylinders of carbon by scraping or otherwise, and then using the best new oil obtainable and the quantity prescribed by the manufacturer of the engine. Driving the car with the proper mixture at the carburetor will generally keep the carbon deposits at minimum. Buy the best oil obtainable and use it as the manufacturer of the engine recommends and carbon while not eliminated will be reduced to such a point as not to be noticeable.

ABNORMAL LOSS OF ELECTROLYTE.

(E. E. H., Grafton, Mass.)

I have a Buick B-25 and am using a Willard battery of three cells. Can you tell me the cause of the cell forward or nearest the generator dissipating its electrolyte quicker than the others. It is my custom to fill the cells with distilled water every two weeks, and I invariably find the first cell almost, if not entirely dry, while the others need but a little water. You will probably say that the cell leaks, but I have made a careful examination of it and do not find any evidence of it leaking, not a particle of white deposit under it, which you would expect to find if it did leak. I do not understand it and would like your opinion.

A cracked jar would probably be evident upon examination, so leakage can be eliminated. One probability is that there is internal discharge, which might result from an accumulation of sediment in the jar to such a depth as to touch the bottom edges of the plates, or from defective separators between plates, or from material scaled from one plate making a short circuit with another, or from abnormally reduced electrolyte which would gas excessively at low charging rate.

A cell so greatly reduced is practically valueless from any point of view. It serves no useful purpose in the car. You cannot determine its serviceability yourself so you had best have it examined at a service station. There is a possibility that it may be restored so as to have normal efficiency, but this is hardly probable. Such examination would establish its condition. It might be possible to rebuild it and this had best be done, if attempted at all, by an expert.

(When Writing to Advertisers, Please Mention the Automobile Journal.)

THE BREATH OF WINTER

Is In The Air

CONGEALING or frozen oil in the crank case is the cause of many Winter motoring troubles.

Stripped gears
Scored cylinders
Burnt out bearings
Run down batteries

A great many oils freeze solidly at 10 degrees above zero, as they contain paraffine, which thickens in moderately cold weather.

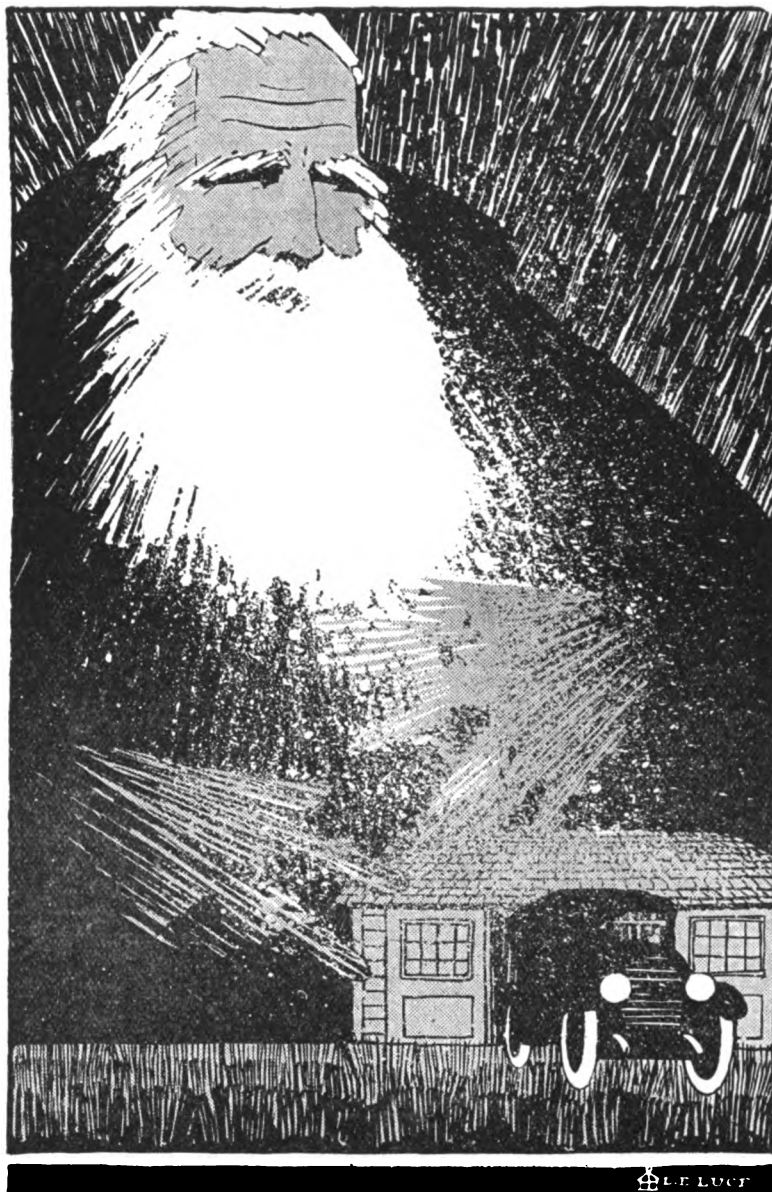
SUPREME AUTO OIL

Flows Freely
at Zero

Starts With
the Engine

There can be no possible lack of lubrication, even below zero, as SUPREME AUTO OIL positively contains no paraffine, being manufactured from Southern Asphalt-base Crude. Get it from any dealer displaying the sign of the orange disc.

Write for booklet for further particulars, prices, etc.



GULF REFINING COMPANY

General Sales Offices: Pittsburgh, Pa.

DISTRICT SALES OFFICES:

New York

Philadelphia

Boston

Atlanta

New Orleans

Houston

(When Writing to Advertisers, Please Mention the Automobile Journal.)

A new way to find every engine trouble

EASY, QUICK, POSITIVE!

Here is a quick way to find the cause of any trouble in a gasoline engine of any type. No more cranking a "dead" engine; no need to run an engine idle while you guess what is wrong.

Suppose a customer drives up with an engine that is not working properly. Instead of a tryout on the nearest hill, open the hood, take out the spark-plugs and screw a

Hempy-Cooper Motor Tester

in the place of one of them.

Bring the piston up to compression dead center, and the valve on the tester tells just what the compression is and how fast it leaks off. Now let the handle up and bring it down sharply. You can hear air hiss through a leaky inlet valve and out through the carburetor. If the exhaust valve leaks, you can hear the air rush through the manifold

and into the cylinder that is on exhaust cycle.

Other faults can be found with the Hempy-Cooper Tester. Loose bearings, loose piston rings, piston slap, for each there is a positive indication. You can keep right on testing as you adjust.

A Hempy-Cooper Tester takes guess work out of your testing—with it you can tell your pa-

THE HEMPY-COOPER
Motor Tester is another of the real helps to a motorist and repairman sold under "The Fairbanks Company O. K." Some of the others are

SERVISTOCK SHELVING FOR FORD PARTS

Motor Testers
Bearing Burning-in Machine for Ford and Fordsons
Motor Test Stands
Engine and Axle Stands
Bearing Boring Machines and Re-Babbiting Jigs
Cylinder Re-boring Machines for Fords and Fordsons
Straightening Presses
Arbor Presses
Power Grinders
Air Compressors
Transmission Reaming Machines
Special Ford Reamers
Rear Axle Sleeve Pullers
Radiator Test Plugs
Piston Clamps
Connecting Rod Straightening Jigs
Bench Motor Clamps
Transmission Drum Clamps
Rear Axle Pinion Gear Presses
Pinion Gear Pullers
Piston Bushing Reamers
Crank and Cam Shaft Testing Machines
Emergency Wheel Clamps
Wheel Pullers
Valve Port Renewing Tools
Bushings Drivers
Turning Bars
Speed and L Wrenches
Special Jacks
Rim Tools
Tow Bars
Combination Electric Drills and Valve Grinders
Visible Measuring Gasoline Pumps
Special Ford and Fordson Tools and Machines

All are listed in Catalog
8—ask for your copy.

The FAIRBANKS

MILL, MINE & RAILWAY SUPPLIES - SCALES - VALVES - POWER TRANSMISSION - MACHINE TOOLS

(When Writing to Advertisers, Please Mention the Automobile Journal.)

while not running

trons exactly what is wrong, how much it will cost to fix it, and how long the job will take. The very simplicity of the Hempy-Cooper Tester is evidence of its reliability. There are no valves to get out of order, no springs to break, no small parts to lose. Just screw it in place and you are ready to test.

DEALERS

A good thing to show to the mechanically-inclined motorist. Fully protected by patents.

THE FAIRBANKS COMPANY

Administrative Offices, New York

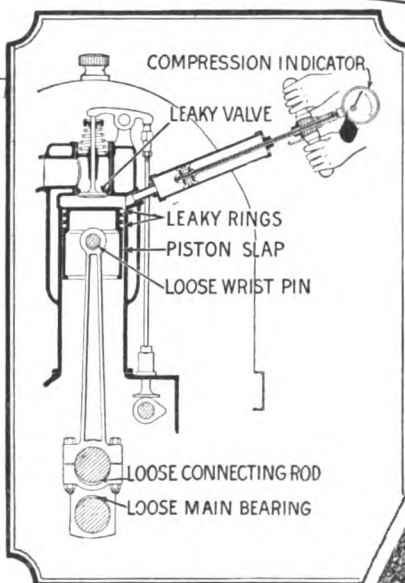
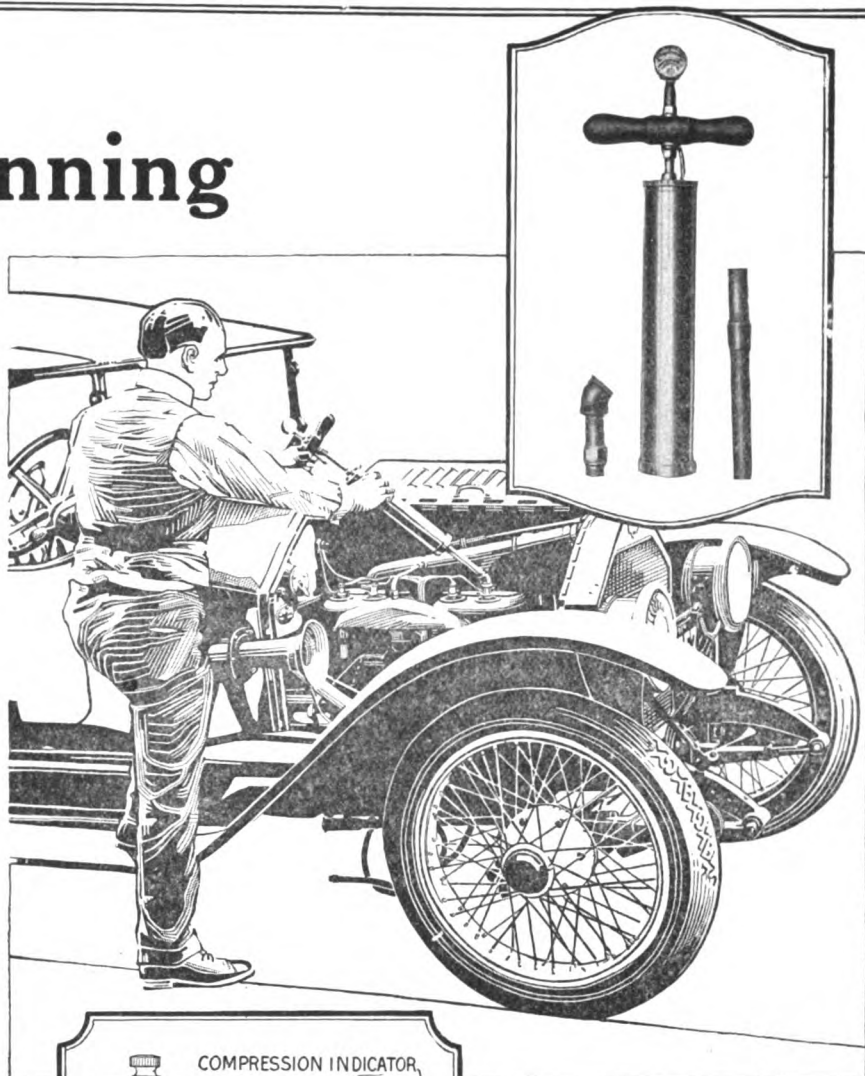
Branch Houses

Albany	Detroit	Rochester
Baltimore	Hartford	Providence
Birmingham	Newark	Pittsburg
Boston	New Orleans	Scranton
Bridgeport	New York	St. Louis
Buffalo	Paterson	Syracuse
Chicago	Philadelphia	Utica
		Washington

Havana, Cuba; London, England;
Birmingham, England; Glasgow, Scotland; Paris, France.

Sole Distributors for
The Service Station Equipment Company
The Hempy-Cooper Manufacturing Company
The Peterson Engineering & Manufacturing Company
The Steere-Kitson Company
and other manufacturers of garage equipment.

Company



The Hempy-Cooper Tester and how it works. Price \$18.00 including fittings for $\frac{1}{2}$ in. standard, $\frac{3}{8}$ in. S. A. E. and Metric spark-plug holes. Fully protected by patents.



TRUCKS & WHEELBARROWS • ENGINES & PUMPS • AUTOMOBILE & SERVICE STATION EQUIPMENT

(When Writing to Advertisers, Please Mention the Automobile Journal.)

What Would You Think of a Manufacturer—

—who wrote to you with a lead pencil—"We are saving much money because we do not use typewriters and telephones"? You might well wonder whether his merchandise was as much out of date as his business methods.

You know that modern time and labor saving appliances are not added expenses, but that they have superseded slower and more costly processes.

The concern which uses your business paper to tell you its business story is simply using a modern piece of selling machinery to make it easier for you to buy intelligently with the least waste of your time and theirs.

For the right kind of advertising shortens the distance between human minds just as certainly as the railroad shortens the distance between places. It is still possible to walk from New York to Chicago, and it is still possible for a business to get along without advertising, BUT—

—bear in mind that the seller who does not advertise does NOT save the cost of advertising, for it costs more to do the work of advertising by other means. Consistent advertisers are progressive merchandisers, and it pays to do business with them.

You are invited to consult us freely about
Business Papers or Business Paper Advertising.

THE ASSOCIATED BUSINESS PAPERS INC.

The International Association of Trade and Technical Papers

Headquarters, 220 West 42nd Street, New York

Motor World
National Builder
National Druggist
National Petroleum News
Nautical Gazette
Northwestern Druggist
Nugent's, the Garment Weekly
Power
Power Boating
Power Plant Engineering
Price Current—Grain Reporter
Railway Age
Railway Electrical Engineer
Railway Maintenance Engineer
Railway Mechanical Engineer
Railway Signal Engineer

Retail Lumberman
Rubber Age
Shoe Findings
Shoe and Leather Reporter
Shoe Retailer
Southern Engineer
Southern Hardware and Implement Journal
Sporting Goods Dealer
Starchroom Laundry Journal
Tea and Coffee Trade Journal
Textile World Journal
Timberman
Transfer and Storage
Twin City Commercial Bulletin
Woodworker

LIST OF MEMBERS

Each has subscribed to and is maintaining the highest standards of practice in their editorial and advertising service.

Advertising and Selling
American Architect
American Blacksmith
American Exporter
American Funeral Director
American Hatter
American Machinist
American Paint Journal
American Paint and Oil Dealer
American Printer
American School Board Journal
Architectural Record
Automobile Dealer and Repairer
AUTOMOBILE JOURNAL
Automotive Industries
Bakers Weekly
Boot and Shoe Recorder
Brick and Clay Record
Buildings and Building Management
Building Supply News
Bulletin of Pharmacy
Canadian Grocer
Canadian Railway and Marine World
Candy and Ice Cream
Chemical and Metallurgical Engineering
Clothing and Furnisher
Coal Age
Coal Trade Journal
Concrete
Cotton
Daily Iron Trade and Metal Market Report
Domestic Engineering
Dry Goods Economist
Dry Goodsman
Dry Goods Reporter
Electric Railway Journal
Electrical Merchandising
Electrical Record
Electrical Review
Electrical World
Embalmers' Monthly
Engineering World
Engineering and Mining Journal
Engineering News-Record
Factory
Farm Machinery—Farm Power
Foundry (The)
Furniture Journal
Furniture Manufacturer and Artisan
Furniture Merchants' Trade Journal
Gas Age
Gas Record
Grand Rapids Furniture Record
Haberdasher
Hardware Age
Heating & Ventilating Magazine
Hide and Leather
Hotel Monthly
Illustrated Milliner
Implement and Tractor Age
Industrial Arts Magazine
Inland Printer
Iron Age
Iron Trade Review
Lumber
Lumber Trade Journal
Lumber World Review
Manufacturers' Record
Manufacturing Jeweler
Marine Engineering
Marine Review
Metal Worker, Plumber and Steam Fitter
Millinery Trade Review
Mill Supplies
Mining and Scientific Press
Modern Hospital
Motor Age
Motorcycle & Bicycle Illustrated
Motor Truck

CUT DOWN YOUR GASOLINE BILL 30%

GASTINE

"GASTINE" is GUARANTEED to give you 30% more mileage, preventing formation of carbon and assuring easier hill climbing ability, faster ignition and greater power.

A Gas Saver—Carbon Destroyer—Power Producer

Keeps spark plugs clean. Absolutely harmless. Sold in concentrated form—easily dissolved in gasoline. 100 tablets in a box.

Used successfully throughout the civilized world.

"GASTINE" is endorsed by the National Ford Owners Club, Inc., N. Y.; U. S. A.; Certificate No. 978. Tested and endorsed by Kean's Works, P. D., and Leading Institutions Universally.

SOLD WITH A MONEY BACK GUARANTEE

MORE 'PEP' IN YOUR MOTOR



TRADE MARK
REG. U.S. PAT. OFF.

THE GASTINE COMPANY, BRIDGETON N. J. U.S.A.

Canadian Distributor

ROBERTSON & MURPHY,

423 Coristine Bldg., Montreal, Can.

ARTHUR G. NASON SALES CO.,

416 Montgomery St.,

San Francisco, Cal.

SOUTHERN GASTINE SALES CO.,

623 Forsyth Bldg., Atlanta, Ga.

COWARD AUTO SUPPLY CO.,

222 Eliot St., Boston, Mass.

A. M. LANE,

253 Central Ave., Albany, N. Y.

KING HARDWARE CO., Atlanta, Ga.

JOHN K. GEWINNER CO., Atlanta, Ga.

AMERICAN MOTOR CLUB,

(Six Stores) Philadelphia, Pa.

KEIM SUPPLY CO.,

1227 Market St., Philadelphia, Pa.

THE GASTINE SALES AGENCY,

253 Central Ave., Albany, N. Y.

New England Distributor

G. & H. SALES CO.,

210 Harvard Ave., Allston, Mass.

ELM STREET GARAGE, Nashua, N. H.

MONROE TIRE & SUPPLY CO.,

240 E. 54th St., New York City.

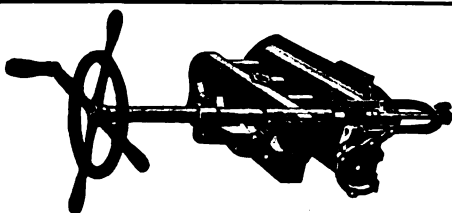
WARE BROS., Spokane, Wash.

BRYANT & WARE, 246 Norwell St.,

Dorchester, Mass. Field Manager.

Dealers write for prices. Some territory still open. If consumers or dealers cannot be supplied from their jobber or dealer, they can order direct from this office. Always give name of their jobber or dealer.

Repairmen,
Listen!



Patented May 19, 1914; Dec. 15, 1914; June 20, 1916; June 26, 1917.

The Heiser Improved Cylinder Reboring Tool for FORD MOTORS is the only reboring Tool in the world that is self-sharpening. It is the only tool that rebore between centers—this insures a finished cylinder, square with the crankshaft, round, straight, true and free from taper. It is adjustable and the only tool that will rebore different sizes without losing the adjustment. The best mechanic in the world can't build reputation without proper TOOLS and EQUIPMENT. THE HEISER IMPROVED CYLINDER REBORING TOOL makes good shops out of poor ones and better shops out of good ones. Write today for full particulars.

HEISER SPECIAL TOOL CO., 216 Rogers Bldg., Kingston, Mo.

Tarvia

PREVENTS DUST PRESERVES ROADS

Booklets on Request

THE BARRETT COMPANY

New York Chicago Philadelphia Bos-
ton St. Louis Cleveland Cincinnati
Pittsburgh Detroit Birmingham Kan-
sas City Minneapolis Nashville Salt
Lake City Seattle Peoria



FULL SPRING ACTION

Absorbs all road shocks
Protects chassis mechanism
Insures riding comfort
Increases fuel and tire mileage
Decreases operating and maintenance cost

Spring Rusting Is Certain

It is the greatest and most general cause for car deterioration.

BROWN SPRING OILERS

Are a positive protection of any automotive vehicle. They contain oil reservoirs that automatically lubricate the springs to the exact degree that will insure full resiliency.



Can be installed by any owner. Sold by all dealers with ironclad guarantee of satisfaction.

Booklet on car and spring care sent at request.

Brown Spring Oiler Company

6913 CARNEGIE AVENUE, CLEVELAND, OHIO

Keeps Your Motor Smooth and Powerful

The Humistat is the first and only motor humidifier that will positively eliminate carbon troubles on every make of passenger car or truck. Wholly automatic in action and always under the driver's control from the dash.

It protects valves, bearings and piston rings from the destructive action of hard carbon so that taking down the motor becomes seldom or never necessary. It "Knocks out the Knock"—saves gasoline and repair bills—keeps spark plugs clean—and gives that flexibility and power a motor develops only when the atmosphere is damp.

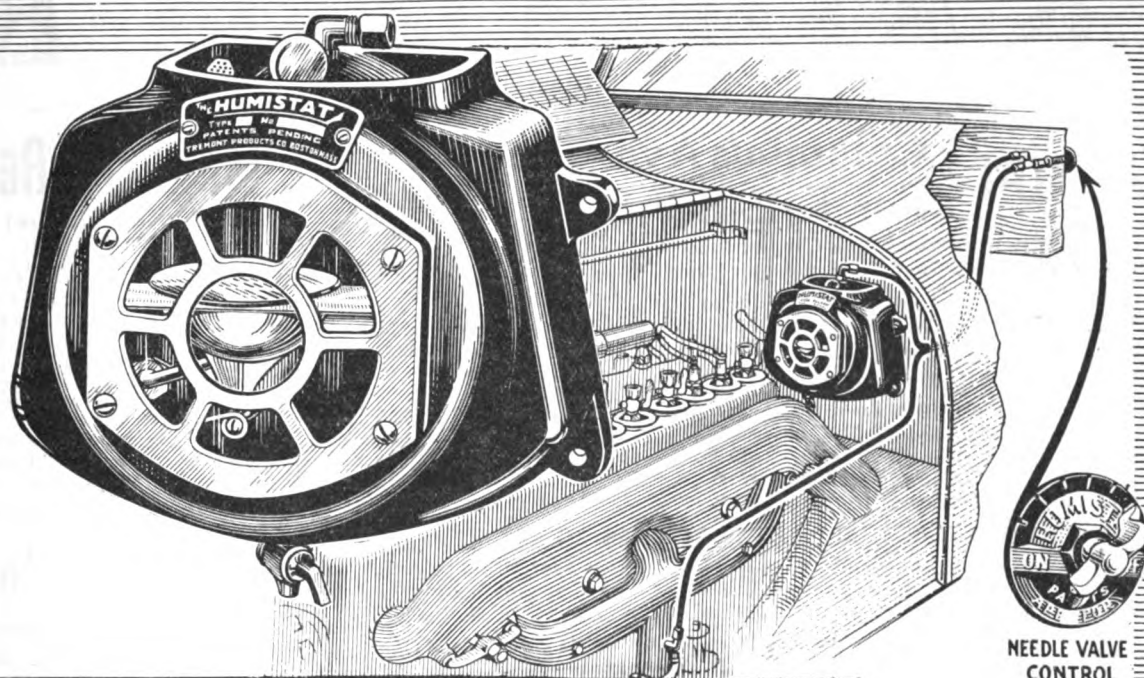


**Kills
carbon
cares**

Dealers:

The Humistat is as essential to a motor as the carburetor. There is an unusual sales opportunity waiting you—write now for dealer proposition.

(When Writing to Advertisers, Please Mention the Automobile Journal.)



and for circular that
ains the Floating Air
layer and Dash Con-
—exclusive and pat-
d features which
inate the bother and
iswork common to
r humidifiers.

Humistat

Gasoline Saved With Humistat on Franklin Car

Recently a Franklin Car owner made a comparative test of the Humistat. The car was a new Franklin, cylinders clean, so no carbon influenced the results.

By actual comparative tests over the same stretch of road and under the same conditions, actual records show the Humistat increased the Franklin mileage over three miles to a gallon of gasoline. Copy of this unsolicited signed report shown on request.

The Humistat is just as valuable during the winter weather as in the milder seasons. Only in very extreme cold weather, and then only if exposed for a considerable length of time, will it freeze. To avoid this happening, however, the pet cock at the bottom of the outfit provides a means of draining it. The Humistat requires only the same reasonable care as the radiator.

Exclusive New England Distributors:
PETTINGELL-ANDREWS COMPANY
100 BROOKLINE AVE., BOSTO

TRADE OUTLET

At 304
**Columbus Ave.
For K-E-E-P-S**
304

Selling Slightly Used Tires. The Largest Stock in the East. "Your Money's Worth or We Make Good." Remember Our Prices Will Interest You.

Size	Tires	Size	Tires
30x3	\$4.50 down to \$2.40	33x4 1/2	\$12.00 down to \$6.00
30x3 1/2	6.50 down to 3.40	33x5	14.50 down to 8.00
32x3 1/2	8.75 down to 3.90	35x4	10.50 down to 9.00
31x4	8.00 down to 4.00	34x4 1/2	10.00 down to 6.00
32x4	8.25 down to 5.00	35x4 1/2	12.00 down to 6.50
33x4	9.00 down to 5.50	36x4 1/2	12.00 down to 6.00
34x4	10.75 down to 6.00	35x5	25.00 down to 6.90
32x4 1/2	12.00 down to 7.00	36x5	12.00 down to 8.00
		37x5	14.00 down to 6.00

USED TUBES, ALL SIZES, AT \$1.50 TO \$2

MAIL ORDERS given prompt attention. Tires sent C. O. D. with privilege of examination. 5% discount if cash or money order comes with order.

BOSTON AUTO TIRE EXCHANGE
304 COLUMBUS AVE. TEL. B. B. 7329

Magneto Repairs

Skillfully Done. Assured Satisfaction. Prompt Service.

The repair work turned out of this shop is of the highest merit—because I know how. If you have electrical and magneto troubles, no matter whether it is a

BOSCH, SPLITDORF-EISEMANN, or any other make, I can fix them. My well-appointed plant, coupled with skilled workmen, assures you of expert magneto service. Send in your magneto. 24-hour shipment.

Rebuilt Magnetos, Platinum Parts, Generator Brushes, Bearings, Etc.

Correspondence Invited.

The Magneto Shop

JOHN BRUNSWICK,

187 Massachusetts Ave., Boston, Mass.

Magneto and Generator Exchange of N. E.

44 COLUMBUS AVENUE, BOSTON, MASS.

SAVE 50%

Offers

Quality Service for your car.

Starting, Lighting, Ignition.

One year guarantee on repairs and installations of all makes.

Everything pertaining to Auto, Electricity, Magneto and Generator Parts. We have one of the best equipped shops in New England devoted exclusively to this work.

BOSCH, SPLITDORF, EISEMANN, DIXIE, BERLING MAGNETOS
and Parts Always in Stock.



SPECIALTIES for the Ford

They stop the rattle in—
The Brake Rod Supports for 35c.
The Brake Rod Clevises for 50c.
The Spark and Throttle Rods for 25c.
The Steering Spindles for 50c.
They serve many other useful purposes and are

inexpensive.
JOBBERs, DEALERs, write for prices and folder which mean money for you.
Affa Specialty Co., 34-D Southbridge St., Worcester, Mass.



BOSTON'S Finest Equipped Auto Electric Repair Service

With a staff of trained electrical men we can offer auto owners expert service, coupled with promptness and personal attention to all electrical repair problems. We also repair any electrical equipment used on a motor car. Official service and parts representative for

AUTO-LITE LIGHTING AND STARTING SYSTEMS.
Complete Stock of GENUINE PARTS.

All Work and Parts Guaranteed.

William H. Flaherty Co.

74 CUMMINGTON ST., BOSTON, MASS.

Tires Guaranteed 5000 Miles

30x3 plain	\$8.00
Non-Skid	\$10.00
30x3 1/2 plain	\$11.00
Non-Skid	\$13.50

Big saving on other sizes and tubes also. Trade in your old tires. 20% deposit required on C. O. D. orders.

Write for lists to

M. Liben & Co.

793 J 7th Ave., New York City.

JACKSON PARTS ALL YEARS and MODELS

Prompt and Satisfactory Service Guaranteed.

Jackson Motor Service Co.
Brighton District, Boston, Mass.

SALESMEN AND DEALERS—A million Ford owners are waiting for you to show them the only safety steering attachment; takes that jerk out of the Ford steering wheel and makes it steer like a Packard; pays for itself in tire saving; put it on your car and dozens want it; if you have small capital and can put canvassers out to sell the owners, selling yourself to the trade, you can make a small fortune. Write today. Saxton Auto Accessory Co., Inc., 347 Fifth Ave., New York City.

(When Writing to Advertisers, Please Mention the Automobile Journal.)

TRADE OUTLET

TIRES

JOB LOTS

Obsolete, Surplus Stocks and
Factory Seconds

WRITE—CALL

BROADWAY TIRE JOBBERS

250 West 54th Street

New York

AUTO SAVE 50-90% PARTS FOR 400 CARS

POPE, PACKARDS, PIERCE, BUICK,
STEVENS-DURYEA, KNOX, OVER-
LAND, ETC.

Motors, \$25.00 up	Presto Tanks, \$4.50 up
Magnetos, 4.00 up	New Spotlights, 2.00 up
Carburetors, 3.00 up	Generators, 10.00 up
Rear Axles, 15.00 up	Gears, 1.00 up
Front Axles, 5.00 up	Bearings, 1.00 up
Cylinders, 5.00 up	Radiators, 10.00 up

\$12 Diamond Bumpers.....\$5.50
Jobbers in Bankrupt Auto Supplies.

BRIGHTMAN AUTO EXCHANGE

321 Windsor Ave., Hartford, Conn.

AUTO PARTS.

50% to 90% Off List.

24 Hour Service. Unlimited Stock.

Pope-Hartford, Columbia, Reo,
Overland and 200 other makes.

Motors, \$20.00 up	E. Presto Tanks, \$4.00
Magnetos, \$3.50 up	B. Presto Tanks, \$4.75
Cylinders, \$3.00 up	Bearings, 50c up
Springs, \$1.00 up	Rims, \$1.00 up

1000 Other PARTS Bargains.

If you want any part not listed here,
Write Us—We Have It.

Conn. Auto Parts Co., Inc.

1070 Main St., Hartford, Conn.

Atwater-Kent Sales Co., of New England

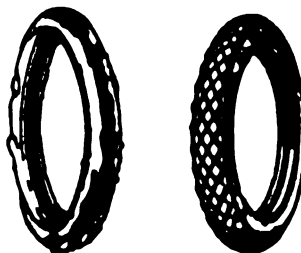
883 BOYLSTON ST., BOSTON, MASS.

Official
SALES AND SERVICE
For New England.

Complete stock of parts always
on hand.

Write for Price List.

BOSTON RETREAD TIRE CO.



Before

After

OUR METHOD OF RETREADING IS
DIFFERENT FROM OTHERS.

We use all Goodyear first quality stock
and retread bands and can absolutely
guarantee from

3000 to 3500 Miles.

We will replace a new tire for every
one that our work does not give satis-
faction.

Tires called for and delivered. We pay
express charges one way on all out-of-
town orders.

Price List Mailed Upon Request.

BOSTON RETREAD TIRE CO.

70 Clarendon St., Boston, Mass.

CHEMIST AMAZING DISCOVERY.
25 Miles on One Gallon Gas.
MOTOROL, 25 to 50% more miles per
gal. 25 to 35% more power.
Means faster ignition, uniform combus-
tion, no carbon deposits, less wear and
tear on motor, higher test of gasoline.
Agents Wanted. One Dollar Postpaid.
AUTO PRODUCTS CO., Dept. 70, 226 W.
138th St., N. Y.

Classified Advertising BRINGS BIG RETURNS

20 Cents a Line, Seven Words to Line.

AUTO PARTS—At Your Own Prices.
We can supply parts for nearly every
make of car. 648 Packards, Interstate
Fours, also Truck parts, GMC and
other makes.

Write us for Parts. We have them.

STRANDWAY AUTO PARTS CO.,
193-195 H. St., South Boston, Mass.

We Are Exclusive
SELLING AGENTS
for the N. F. G.

CARLISLE CORD TIRE.

Dealers write for our special propo-
sition.

CAMBRIA TIRE EXCHANGE.

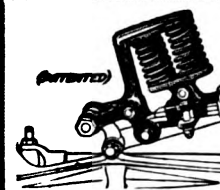
204 Columbus Ave., Boston, Mass.

TIRES AND TUBES

Demonstrating and Factory Repaired.
Economy, Quali-
ty, Price. All
Standard

Size	Tires	Tubes	Size	Tires	Tubes
80x8	\$5.00	\$1.85	36x4	\$9.00	\$1.75
80x8 1/2	6.00	1.45	34x4 1/2	9.35	1.75
82x8 1/2	6.50	1.50	35x4 1/2	9.50	1.80
31x4	7.25	1.65	36x4 1/2	9.75	1.85
32x4	8.00	1.60	35x5	10.50	2.00
33x4	8.75	1.70	37x5	11.00	2.20
34x4	8.75	1.70			

Write for Prices on Odd Sized Tires. **TERMS:**
\$1.00 deposit with each tire ordered, balance O.
O. D. subject to inspection. Specify style of
rim to avoid delay. Although used tires are not
guaranteed for any definite number of miles,
we guarantee our tires to give the best
service in proportion to the prices paid, or rea-
sonable adjustments are made.
LIBERTY TIRE CO., 2119 So. Michigan
Ave., Dept. I, Chicago, Ill.



Front Absorber

**Champion Shock Absorber Sales Co.,
Inc.**, Indianapolis, Ind., Mfs.

FOR FORD CARS.
"Champion" Shock Ab-
sorbers. The perfect
spring suspension. Ab-
sorbs all jar and re-
bound. Easy to attach.
Fully guaranteed.
Makes Fords ride as
easy as any \$5000 car.
Ford dealers, agents
and owners, this ad is
worth \$10 to you. Ask
why. Write today.

(When Writing to Advertisers, Please Mention the Automobile Journal.)

AUTOMOBILE JOURNAL

INDEX TO CONTENTS

Published Monthly by the
AUTOMOBILE JOURNAL PUB. CO.
Times Building, Pawtucket, R. I.

WILLIAM H. BLACK.....Treasurer
DAVID O. BLACK.....Secretary

Branch Offices: New York City, Chicago, Detroit,
Boston, St. Louis, Cleveland.

SUBSCRIPTIONS:

United States and Mexico (Postage Paid) the year \$1.50
Canada\$2.50
Foreign Countries in Poston Union.....\$3.50
The Copy.....20 Cents

PARTIAL LIST OF CONTENTS

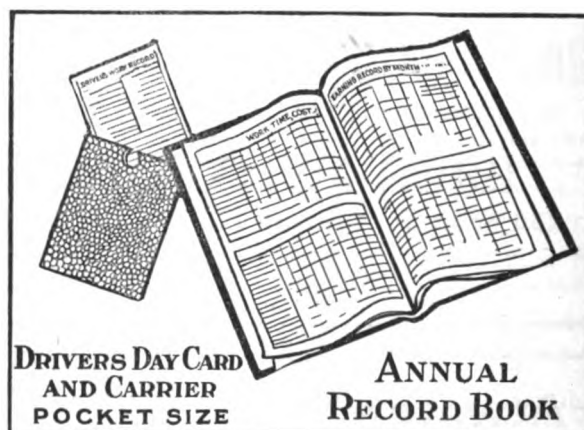
	Page
Boyer Winner in World's Series Race.....	13
Troops Enforce Traffic Laws in Boston.....	14
Says Babies Should Be Run Like Autos.....	15
How to Keep Brakes in Good Condition.....	16
Latest Fashions for Motoring.....	17
Grant Has New Light Six Model.....	20
New Overland Four Is Announced.....	21
New Liberty Sedan and Coupe.....	22
Humorous Side of Motoring.....	23
How to Fit New Piston Rings.....	24
Taking the "Growl" Out of the Axle.....	26
Nash Backs White and Howard.....	27
Renewing Defective Gaskets.....	28
Proper Care for Valve Stems.....	29
Suggested Design for Home Garage.....	30
New Accessories and Equipment.....	32
Jobbers Ready for Big Show.....	45
Wiring Diagrams for Dodge Cars.....	46
How to Care for Spark Plugs.....	47
Tire Industry and Trade Notes.....	48
Leach-Biltwell Six-Cylinder Car.....	50
New National Sextet Is Beauty.....	53
Eliminating Rattles and Squeaks.....	54

Know what it costs to Run your Truck

Learn what your Truck Earns

Know your Truck Profit and Loss

UNIVERSAL MOTOR TRUCK ACCOUNTING SYSTEM



The system includes an annual record book, 350 drivers' day cards, a day card carrier and full instructions.

Any owner can start this system at any time with an old or new truck of any make or type.

Any boy or girl clerk can maintain all records for one or a hundred trucks.

Each system is good for one year, nothing more is needed or necessary.

The records show at a glance any and all items entering into the earnings and cost of operation.

It is extremely simple. 100% complete and full working instructions are supplied with each system.

It is almost self-operating.

Price \$10 — Delivered

Address Record Department

MOTOR TRUCK

Pawtucket,

Rhode Island.

TRADE MARK
EAGLEINE
REGISTERED
MOTOR OILS



EAGLEINE OILS

are unequalled for motor lubrication, freer from carbon, economical because they protect the motor against mechanical wear, and the quantity required is comparatively small.

These are the claims of thousands of motorists,—some with years of experience, who want full value, and more who know the value of high grade lubricants, and who know when they obtain satisfaction.

EAGLEINE QUALITY IS INSURED TO YOU

A grade for every type of motor. It is sold in sealed containers.

*Let us send you our new book and chart.
It is free at request.*

EAGLE OIL AND SUPPLY CO.
44-45-46 India Street, Boston, Mass.

NEW YORK CITY
Woolworth Building

CHICAGO
1132 W. 37th Street

AUTOMOBILE JOURNAL

INDEX TO ADVERTISERS

	Page
Affa Specialty Co.....	8
Associated Business Papers, Inc.....	52
Atwater Kent Sales Co. of N. E.....	9
Auto Products Co.....	9
Barrett Co., The.....	5
Barrett Motor Starter Manufacturing Co., Inc.....	60
Boston Auto Tire Exchange.....	8
Boston Retread Tire Co.....	9
Brightman Auto Exchange.....	9
Broadway Tire Jobbers Co.....	9
Brown Spring Oiler Co.....	5
Coes Wrench Co.....	64
Connecticut Auto Parts Co., Inc.....	9
Culver-Stearns Manufacturing Co.....	62
Dixon Crucible Co., Joseph.....	64
Eagle Oil and Supply Co.....	11
Fairbanks Co.....	50, 51
Flaherty, Wm. H.....	8
Gastine Co.....	53
Grant Motor Car Co.....	Insert
Gulf Refining Co.....	49
Heiser Special Tool Co.....	5
Hood Tire Co.....	Cover
Hotel Wellington.....	62
Jackson Motor Service Co.....	8
Liberty Tire Co.....	9
Magneto and Generator Exchange of N. E.....	8
Magneto Shop.....	8
Metz Sales Corporation.....	60
National Can Co.....	63
New Departure Manufacturing Co.....	64
New York and New Jersey Lubricant Co.....	63
Nielsen Co., V. A.....	59
Paige-Detroit Motor Car Co.....	62
Panvar Co.....	61
Pierce-Arrow Motor Car Co.....	Cover
Red Head Spark Plug Co.....	Cover
Reo Motor Car Co.....	61
Standard Oil Co. of N. Y.....	Cover
Strandway Auto Parts Co.....	9
Tremont Products Co.....	55, 56
Wellington Hotel.....	62
Zenith Carburetor Co.....	60



REO

World's Largest Producer Yet Far Behind Demand

¶ Reo is the largest producer of pneumatic-tired motor trucks—we said trucks, not little delivery wagons—and yet we have never been able to supply the demand for Reo “Speed Wagons.” ¶ Not even to get in sight of it, so to say. ¶ Fast as we can enlarge the truck departments of the Reo plant and increase production, still the demand for Reos continues to gain on us. ¶ There's a reason for this. ¶ In a sentence, it is Reo quality and Reo service. ¶ Of course we might catch up with the demand were we willing to sacrifice quality in the interests of mere volume. ¶ But that is contrary to all Reo precedent and policy. ¶ We have never been ambitious to make all the motor vehicles—only the best. ¶ And so, while we are striving to more nearly approach the demand, we shall never make more Reos than we can make and make every one as good as the best ever turned out of the Reo shops. ¶ That's why the demand always exceeds the supply of Reo “Speed Wagons.” ¶ That's why this condition is likely to long continue. ¶ It's a good condition—from the user's standpoint. ¶ From the dealers' too—for their satisfaction and net profit in selling an article that stays put.

Reo Motor Car Company
Lansing, Michigan

“The Gold Standard of Values”

(When Writing to Advertisers, Please Mention the Automobile Journal.)

Joe Boyer Wins Sweepstakes At Cincinnati

His Victory the Result of Remarkably Consistent Driving
— Art Klein Captures Second Honors

JOE BOYER in his Frontenac was the winner in the world series sweepstakes at Cincinnati, Oct. 12. During the entire race of 250 miles he made only one stop, this being when a tire picked up a splinter on a turn, and his time was 2:27:19, or 101.69 miles an hour.

Art Klein, driving a Peugeot, came second, and Kurt Hitke, in a Kenworthy, won third honors. Hitke's car is said to have been the rebuilt Roamer he drove in previous races, and which was entered by C. Y. Kenworthy, Chicago Roamer dealer.

The race followed two postponements on account of inclement weather. Fifteen cars competed, Arthur Chevrolet, in a Frontenac, driving for his famous brother, Louis, who was severely burned when his car caught fire at Sheepshead Bay several weeks ago, led the field from the start, but was compelled to retire from the race on account of mechanical troubles. A jinx also followed Gaston Chevrolet during the afternoon, and after a half dozen stops at the pits finally went out of the contest.

Boyer, who is the son of the millionaire president of a Detroit adding machine company, and himself a member of the board of directors, verified his own prediction of victory, in winning the Cin-

cinnati classic. Just before the start of the race he confidently announced to his rivals that he would win the race—and then set out to make good his prophecy.

Boyer won by alternating his usual racing style. In previous races he has al-

to go out of the contest. Of the 15 drivers who started the following had to drop out: A. Chevrolet, Murphy, Joe Thomas in a Mercier, Eddie O'Donnell in a Duesenberg, Toland Nicholson in a Hudson and G. Chevrolet.

There were several stretch duels, but aside from these there were comparatively few thrills. The attendance was not large, probably due to the threatening weather. The clouds did not clear away until noon, when the sun came out to dry the track, sodden from the heavy rains which had caused postponement from the preceding day.

In addition to the two postponements due to the weather, the contest was also delayed from its original date because of the world series baseball championship. It was the first post-war race at Cincinnati.

The Cincinnati officials, while disappointed at the delays, announce that they are not discouraged. They say they are confident that their track is an unusually good one, and they are already beginning to work on plans for next year.

The Cincinnati world's series sweepstakes contest was the last big racing event for this season.

The Results.

Car	Driver	Time	M.P.H.
Frontenac	Joe Boyer	2:27:19.29	101.69
Peugeot	Art Klein	2:30:20.32	99.08
Kenworthy	Kurt Hitke	2:34:31.65	97.00
Meteor	Dave Lewis	2:37:39.61	95.25
Stickel	D. Hickey	2:39:24.10	94.25
Bender	Tom Alley	2:40:21.24	93.55
Oldfield	Waldo Stein	2:41:52.75	92.75
Toft	Omar Toft	2:46:35.72	90.2
Peugeot	Paul Harvey	Flagged	



JOE BOYER.

ways been noted for his furious driving, which not infrequently caused his car to "break up," eliminating him from the race. But at Cincinnati he set a slower pace and by maintaining it steadily throughout the contest finished an easy winner.

Despite the fast time no accident occurred to mar the afternoon's program.

gramme, the feature being the wonderfully steady and consistent driving of the winner.

Ralph De Palma endeavored to break his hard luck by having James Murphy drive his Duesenberg for him, but the jinx remained and the car was the first

Troops Enforce Traffic Rules in Boston

EVERY day is now tag day in Boston and the State Guardsmen are tagging the automobiles of motorists who violate the traffic rules. If the owner leaves his car in a parking space longer than the time permitted by law, he probably will find it tagged upon his return. The tag, placed on it by one of the state troops, will notify him to appear at the Cadets' Armory for an interview with the commanding officer of the Motor Corps of the State Guard.

When the Hub policemen went out on strike there was no one to direct traffic. The authorities appealed to Chester I. Campbell to get volunteers to do temporarily the work formerly done by the traffic officers at congested street intersections. Mr. Campbell induced a large number of automobile dealers and salesmen to take up these duties, and they handled things in fine style for more than a week.

Then the State Guard took over the work. They put in several new regulations and made the traffic rules in general more stringent than ever. Even the

pedestrians were affected, the new law compelling them to obey traffic officers' signals, in just the same manner as the drivers of vehicles have to follow them. White lines were painted at street intersections and automobilists now have to remain behind these when the pedestrians have the right of way in crossing the street. On the other hand, when the vehicles have the right of way pedestrians are supposed to remain on the sidewalk.

Warn Pedestrians.

"Pedestrians must obey the traffic officers' whistles just as much as automobile drivers," stated one of the regulations. Another cautioned person on foot not to cross the street diagonally, but keep close to the sidewalks. An educational campaign was started to make the pedestrians understand that they were just as responsible as the autoists, and that if they failed to obey the traffic officers' signals they would be summoned to court.

At the beginning many of the pedestrians did not take kindly to this regula-

tion, as they found that when traffic was particularly congested they would have to stand on the sidewalk several minutes before the traffic officer would give them the right of way by changing the direction of the traffic.

Women paid less attention to the rule than did most of the men, and there were many narrow escapes. Before the rule was in force the motor drivers were more careful, but now, seeing the signal that means an advance, they have become confident that they have a clear stretch before them and, to relieve congestion, they pursue their way as speedily as is consistent with the law. But the pedestrians in many cases fail to heed the white glove of the officer and as a consequence narrow escapes are frequent at such points as Tremont and Beacon streets and Tremont and Court.

Strict Enforcement.

The officers of the Motor Corps issued a proclamation calling for a strict observance of the parking rules. This resulted in many favorite parking sections in the business district being obliterated from the motorist's chart. The time limit on recognized parking places was also enforced. When a State Guardsman found an automobile parked in violation of the rules he did not wait for the owner to return, but put a tag on the steering wheel of the car, notifying the owner to appear at the armory to answer to a charge of violating the traffic rules. The second time the motorist offends he will be summoned to court.

One rule of which many drivers appeared to be ignorant is that they must not leave their vehicles within 10 feet of a fire hydrant; another is that when stopping at a curb the inside wheel must be within two feet of the curbstone. Still another rule is that a driver intending to stop at a curb in a one-way street must not do so unless he can drive directly up to the curb without backing.

To Educate Public.

Lieut.-Col. John W. Decrow, who is in command of the regulation of traffic, said: "It is our intention, as far as possible, to educate the public to respect the white lines. We will insist upon automobiles remaining behind the white lines so that the pedestrians will have ample opportunity to pass. And we will gradually attempt to educate the public into remaining on the sidewalk while the automobiles are having their turn. As soon as the whistle blows, automobiles will stop and the people on foot will have their chance to cross the street."

Lieut.-Col. Decrow makes frequent trips about the city in an automobile and he takes occasion to warn any drivers he finds violating the regulations. He says that 90 per cent. of the vehicle drivers seem disposed to obey the law in every respect.



—Norman in Boston Post.

Under New Traffic Rules in Boston Pedestrians Must Obey the Traffic Officers' Signals the Same as Drivers of Vehicles. Women Were Among the Chief Offenders of This New Regulation. White "Dead Lines" Were Painted at Important Street Intersections.

Says Babies Should Be Run Like Automobiles



ABIES should be run like automobiles to make the right kind of grown-ups, according to Dr. Henry L. K. Shaw of Albany, N. Y., who delivered an especially interesting address on the subject of "Health Building for the Child" at the

International Conference of Doctors in New York City recently. No one would undertake to run an automobile without first learning anything about its machinery, said Dr. Shaw. The average mother has not done this with the child, and that is the cause of much of the mortality among infants.

When a person buys an automobile he is given an instruction book and considerable other literature that tells him everything he ought to know about the operation and care of the car. There are diagrams and charts that vividly impress upon the new owner just what he must do and what he must not do. There is abundant information as to what should be done when anything goes wrong.

Perhaps the stork could be induced to bring along an instruction book when he delivers the baby. The mother—and the proud daddy, too—could read it carefully and learn all about the "mechanism" of the child, so she would know just how to handle it. The book would tell her the "cause, reason and remedy" for all of the child's possible ills.

Perhaps the introduction would run something along this line:

"The pages of this book are intended to assist you to obtain a personal, accurate and thorough knowledge of your child. Such a knowledge will pay you dividends, first—in money saved in doctors' bills, and second—in the satisfaction that you will find in raising a child which you will understand and which will grow up into the right kind of a man or woman.

"The most healthy baby cannot be cared for perfectly unless it is attended by some one who is thoroughly familiar with all its working parts—some one who understands it thoroughly, some one who does not forget to give it that care and attention which every good machine must have to do justice to itself. We are absolutely sure that if you handle your baby with care, attention and an intelligent knowledge of its physical system that it will not only give you satisfaction, but it will make you so happy that you will encourage others to get babies, too."

In order that the parents might understand the "engineering" back of the baby they will be told that the human body is a chemical composition of 14 elements (calcium, phosphorus, sulphur, sodium, chlorine, fluorine, iron, potassium, magnesium, silicon, oxygen, hydrogen, nitrogen

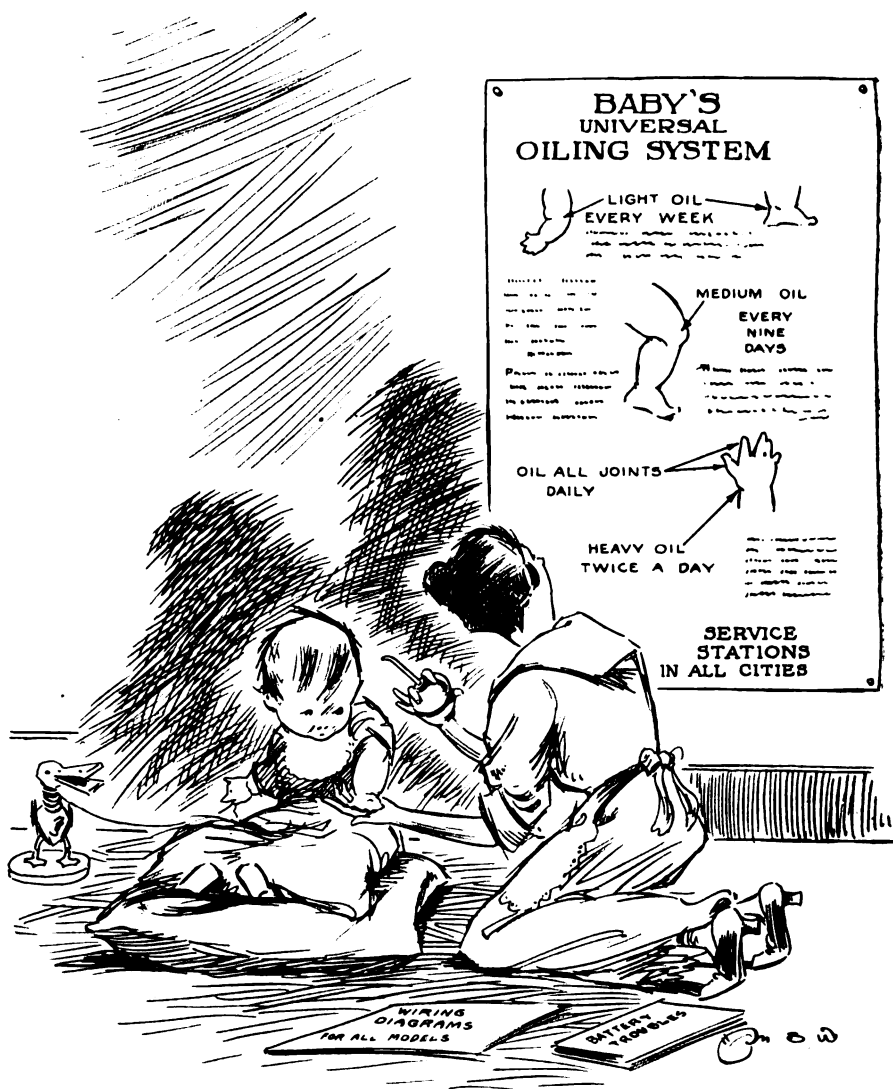
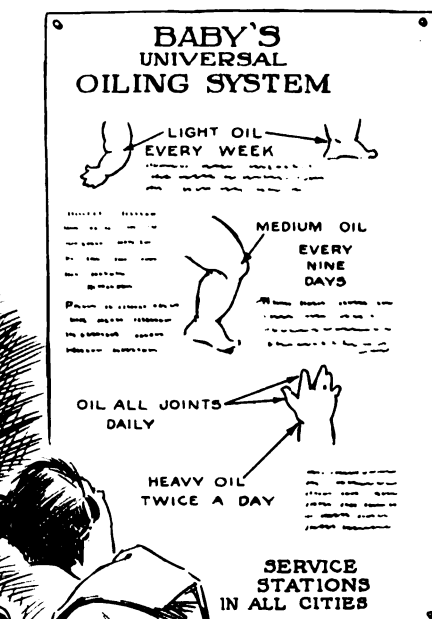
and carbon." Charts will be inserted to explain in detail its complete make-up.

A complete list of "first general instructions upon receipt of your baby" will be included. There will be ample information to enable the parents to assure perfect nutrition, with chapters on nursing, feeding, the baby's wardrobe, baths, care of the teeth, ailments, emergencies, etc.

Just as the automobile book explains the electrical and other systems, the baby book will tell of the muscular and other systems in the child. Valuable hints will be given as to the best grades of milk and other "fuel" the little tot should have. There will be a "wiring" diagram of the nervous system.

In fact, the automobile instruction book will be an ideal for the stork to study when he is preparing his instruction book on the new baby. He will find a great many paragraphs which with just a little paraphrasing will fit very nicely into his care-of-the-baby discourse.

The automobile book explains all of the car's complicated matters in simple



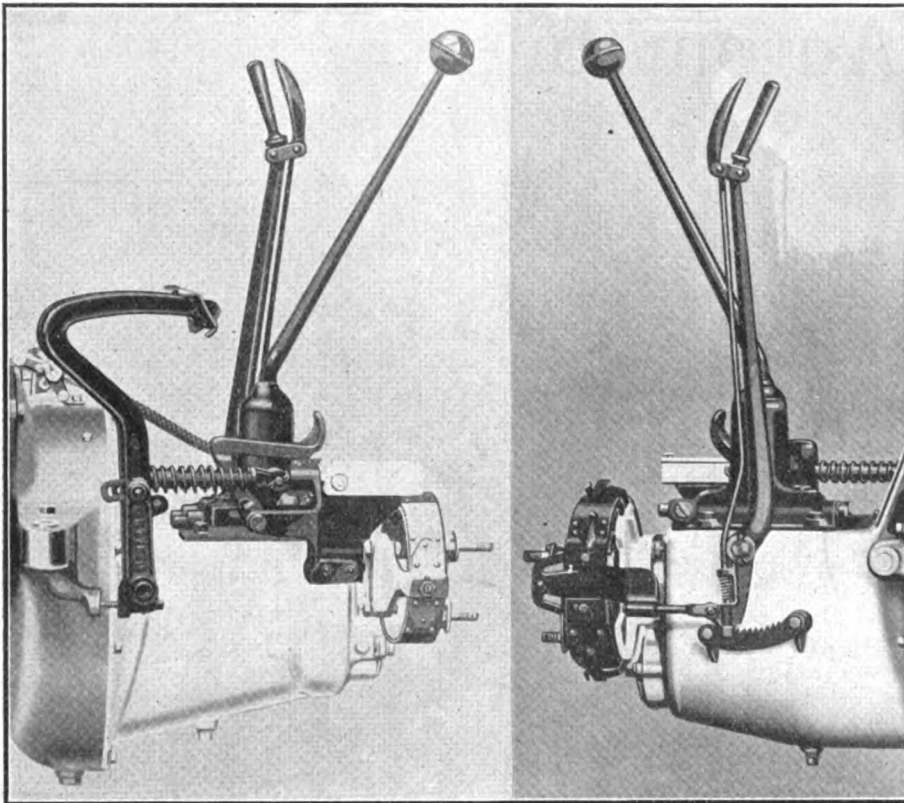
language, so that the person unfamiliar with its mechanism may get a very good idea what it is all about. The baby book could do likewise.

As the learned physician points out, it is just as essential for the mother to know all about the child if she is to employ a nurse, as if she were to care entirely for the baby herself. Car owners who employ chauffeurs will agree with this, for they realize what would happen if they knew nothing about their cars themselves and had to depend wholly upon the knowledge of the professional drivers.

The average car owner takes great pride in his knowledge of the mechanism of his car. If a squeak or anything else develops he knows just what to do. Suppose he knew as much about his baby as he does about his car; think of the fun he could have in diagnosing the little one's ills!

It's a mighty fine idea, and ought to result in better babies. Be sure the stork does not forget your instruction book the next time he drops around your house.

HOW TO KEEP BRAKES IN GOOD CONDITION



Maxwell Service Brake Pedal and Pull Rod at Left; Emergency Transmission Brake, Lever and Quadrant at Right.

IT IS the driver's business before going out to see that the brakes are in good condition. If anything is wrong with them it may be a matter of life and death before the garage is reached again. Every car has two sets of brakes, operating independently of each other, and either one should be in shape to hold the car. There will be little the matter with these brakes if given proper care, if oil is put on where it is needed and kept off where it is not needed, and if worn parts are renewed in time to prevent an accident.

Drivers should learn to use first the foot and then the emergency brake on long hills. This alternation allows each in turn to cool off, for where there is so much friction heat cannot be avoided,

and only by alternating the brakes is there safety from burned out linings. The driver should also learn how to use the motor as a brake. By engaging a lower gear and cutting off the ignition, the engine under compression, speed will be retarded sufficiently so that moderate use of the foot brake is enough for safety.

Brake linings nowadays do not actually burn out, being made of an asbestos composition. They char and lose frictional qualities and the fabric is likely to crumble away from the wire woven within it.

Another serious cause of brake failure is oil. As a rule this comes from the differential, leaking through the axle housing to the hub and thence overflow-

ing to the brake drums. This may be the result of a too liberal quantity in the differential. Then when the car turns off the crown of the road the oil overflows the casing and the only outlet is the axle housing. Sometimes the play of the parts acts like a pump and sends the oil out along the axle.

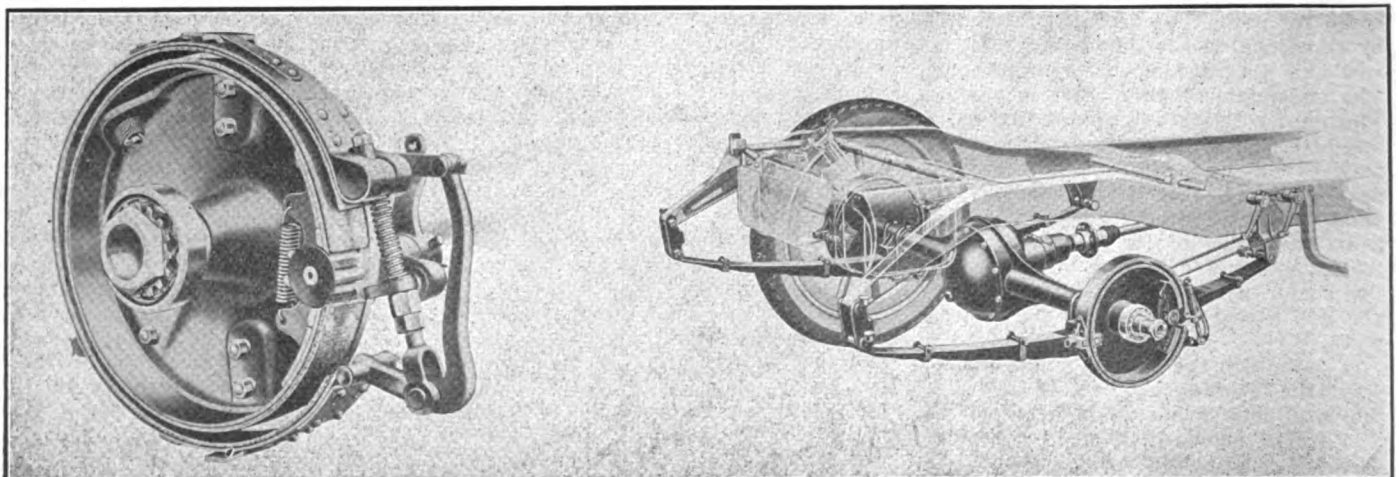
The remedy is using less oil, and if that does not remedy it, put a felt washer in the axle housing. This consists of a long, thin strip of hard felt wound around the shaft. Wind it, beginning at the wheel end, in a direction opposite to the forward motion of the shaft. It should be fastened to the shaft, with shellac and bound with cord in several places. It need not cover more than six or eight inches of the shaft.

If you do not know where to oil the brakes look up the lubrication chart of your car in the manufacturer's instruction book and then locate each bearing by inspection. You will find that they collect plenty of road dust which needs be removed, for this grit makes excessive wear and wear means a weak part which may break.

The springs which hold the brake bands clear of the drums need attention occasionally to see that they do their duty and are not broken. Another thing to watch is the condition of the brake linings. They become greasy and do not grip the drum. The garage man will burn out the grease with a torch after removing the bands. You can save this expense by doing it yourself. Soak it in kerosene and apply a match if you have no torch.

The linings wear thin, so that the retaining rivets score the drum. Better let the repair man replace the linings, but if you are mechanically inclined you may do the job if you can get the proper lining material and remember to countersink the rivets. But it is a job better left to the experienced mechanic.

Adjustments are made in front of each brake band and on the brake linkage. To adjust, jack up the rear wheels, set brake and turn adjustment until each brake, when applied, holds the two wheels with equal force.



Emergency and Service Brake Bands and Emergency Adjustment at Left; Brakes Assembled at Right.

Latest Fashions for Motoring

Fur Coats, or Soft Woolen Ones Lined with Fur or Leather, are Among This Fall's Styles

By MRS. A. SHERMAN HITCHCOCK.

THAT the motor car is now regarded as a vehicle for continuous service is undoubted and the closed car has certainly come into its own. While both the closed and open cars are greatly in evidence throughout the entire year, the increased use of the closed models gives the woman motorist the opportunity of wearing raiment of the most attractive and delicate nature, and the range of motor clothing is therefore very wide and varied.

There is no question about one thing. It is now a fixed rule for the modish woman that motoring must form a considerable part of the year's activities. The desire of nearly every woman of to-day, whether expressed or unexpressed, is to have a car. Motoring not only grows more and more alluring to those who love the sport, but it has also become a necessity and a daily convenience. To motor is a part of the enjoyment of life to every fashionable woman. There are even some who say that to motor makes a person fashionable—consequently even the most skeptical may realize that motoring is a most desirable thing in which to indulge.

For country wear and touring in the fall no coat is too warm, and only the most sensible dressing can make such motoring a pleasure. Fur coats, or soft woolen ones lined with fur or leather,



The New Turned-from-the-Face Toque, Considered One of the Season's Best Models. Made of Velvet with Facing of Metal Broche Pussy Willow Satin. This Hat Fits the Head Particularly Well and Is Practically Wind Resisting.

or perhaps lamb's wool, are the thing for such wear and the tailors and furriers have made ample provision to meet such demands.

The woolen stuffs appropriate for the

motor coat that will give all around service are high in price and scarce in quantity. Never have woolen materials of high grade been so costly and never have they been so beautiful or so truly worth while. The production is limited and the motor woman must use unusual judgment in selection, else she will be sorry.

There are so many materials on the market nowadays, containing very little wool indeed, which are said to be "just as good" as some of the higher priced materials, but they are the poorest investment in the world. They are never "just as good," or anywhere near it and will not stand the wear at all satisfactorily, beside looking decidedly shoddy in a remarkably short time.

Never was a handsomer cloth made for motor coats than the very new Worumbo Travel Cloth. The weavers and dyers have combined in obtaining the most delightful tones and extreme warmth allied to light suppleness. It is as thick as a blanket, soft and velvety to the touch, and is beautiful in a coat. Its wearing qualities cannot be excelled and under the most dire circumstances it still preserves its fine appearance. It is a "thoroughbred" in the world of woolen materials. It is a mingling of shades, soft blues and grays and greens all appearing in one blurred mass, while others show the lovely woody browns with the most artistic combinations.



A—Nippon Mink Coat, Showing Approved Length of This Season, the Shawl Collar, Narrow Belt and Hem Pockets Being Ear-marks of Newest Ideas of Fur Garment Designers. Courtesy Wm. Jackman's Sons, New York. B—Splendid Model of Jap Mink; the Large Shawl Collar and Dolman Effect Are Seen on Practically Every Smart Fur Coat This Season. Courtesy Wm. Jackman's Sons. C—Smart Frock Admirably Adapted for the Motor Woman's Wear, Made of Chinchilla Satin. D—New Cape of Nippon Mink. Courtesy Wm. Jackman's Sons. E—"Palmer Garment" Motor Coat of Hudson Seal Plush, Lined with Silk. Courtesy Percival B. Palmer & Co., Chicago. F—"Palmer Garment" Coat of Henna Mixture, Lined with Silk. Courtesy Percival B. Palmer & Co.

A travel cloth motor coat has a wide panel collar reaching to the waistline, and a very wide self belt. It is cut on straight lines without much sweep at the bottom. Another model is composed of many angular cuts which dovetail and so form a self ornamentation.

Very Smart Model.

The collar of another smart model is cut in one with the fronts and back of model and is genuinely French in effect, as it rises high around the face and is strapped across the front. A very smart model, which is a forerunner of next spring's style according to a noted designer, is similar to a mannish spring overcoat with slit back, narrowly cuffed breast pockets, flapped hip pockets and double darts, which give additional long lines at either side.

Another leading material and one to be as highly recommended as travel cloth is the new Tuskara Duveteen. This material has a beautiful downy surface, equal in its exquisite finish to the finest velvet, but possessing far superior wearing qualities, and is as light as a feather. It is made from the finest Cashemire wool with a pure spun silk warp and comes in all the season's smartest colors.

The browns—and every woman knows by this time that brown is the season's leading color—are the loveliest of shades. The Duveteen makes charming suits and lovely coats and capes. This is also one of the Worumbo materials, which is all that is necessary to tell the knowing and discriminating woman who is looking for service and quality, as well as appearance.

A new motor model of brown Duveteen has its flat, but cape-like back, cut in one with pockets which swing low at either side. Insertions of patent leather were very good looking. An all blue Duveteen cape is drawn in at the ankles and is very full in the center. It is trimmed with black lynx fur on the collar in narrow strips running up and down with about an inch spacing.

New Cape Models.

Capes are always good style for motor wear and are a decidedly comfortable and convenient garment for the motorist to possess. The very new models are mostly designed on circular lines, minus any suggestion of ripple or flare, the flat effect obtained by means of cleverly manipulating the cloth and attaching it to an equally flat and deep yoke. A small cluster of shirring at either side front, just below the shoulder line, tends to shape and afford sufficient fullness. Collars are wide Tuxedo or scarf effects.

Linings for capes and coats are solid tone satin, which enhance the handsome and rich appearance of these garments. The figured silks, which have been used so largely for linings during the past few seasons, are now decidedly passe.

Leather motor coats are extremely modish and are worn by all the smartest motor women. A handsome tan leather, three-quarter coat is quite Indian in appearance with its colored wood beads ornamenting the narrow belt and self-fringed peplum.

The soft suede leather is shown in some handsome imported motor models.

They come in golden brown and raspberry color, and are so manipulated that the belts encircle the bodices which form draped blouses in the back and show odd pockets which are part of the skirt sections. One has a wooden belt buckle and long wooden beads on the self fringe which edges the scarf collar. Some effective leather coats are in pearl gray and white and are lined with diagonal tricotine or English gabardine.

Australian opossum is used for the shawl collar of a finger-tip-length model in gray. Patent leather is a favorite in the trimming line. A very pliable quality being used for pipings, and for backgrounds of stencil work which is stitched on. The stenciling appears on the sleeves and as deep bands at the bottom of the coats.

Fur Garments Predominate.

Very many fur garments are already being sold to motor women and there is no doubt whatever that fur is to be the



A New and Decidedly Chic Motor Hat Made of Velvet with Crown of Metal Broche Pussy Willow Satin. A Vell May Be Worn with This Type of Hat Very Becomingly.

predominating coat of the winter. All fur coats are practically double in price and are in great demand. Australian opossum is again used extensively on coats, wide bands being used at the bottom and collars and cuffs matching. Another modish use of it is the panels on the sides and front and back, about four inches square, with collar and cuffs matching.

The leading furs are squirrel, beaver, caracul, marmot, Jap mink, Sealine, muskrat and Hudson seal. Dolmans, capes and coats are all exceedingly modish and sometimes the models are bloused as on a Russian Cossack coat. No matter what lines the garment follows a salient feature is the deep cape collar, which reaches almost to the top of the head in the back, and may be muffled over the chin in front when chill breezes demand such a protection.

One of the newest and most charming models in motor millinery is the little tam-like turban of gray duvetyn with Kolinsky dyed squirrel used for the thick band about the crown. This band is

made by alternating squares of the Kolinsky dyed and the natural squirrel, and accompanying this there is a small muff covered completely in the alternating squares of the pelt. Kolinsky dyed squirrel is used for a soft little cap shape over which there is a circular veil of brown chiffon having a narrow border of the squirrel.

On the order of a little trench cap is a small motor model made of henna duvetyn and black leather. Hats made of kid are very smart. A draped turban of jade kid is embroidered in tinsel threads, while another is of black patent leather, rolling off the face and trimmed with narrow bands of velvet.

Charming Fur Models.

Off-the-face models are as popular for motor wear as for other occasions and there are some very handsome ones having a facing of the new metal brocades. These are particularly good for wear in the closed cars. Very charming fur motor models are seen in squirrel, mole, Hudson seal, moline, sealine, nutria, muskrat and raccoon. The smartest model that has come to my attention is the "Polo," which comes in all the above mentioned furs, lined with silk. The natural raccoon motor hats are very good.

There are some decidedly fetching new Nymco models in patent leather, as well as other leathers. Turbans, having trimmings of silk pipings and edge, saucy little hats of patent leather having the upper brim and piping of silk; trim creations in real leather in shades of brown, tan, Russian green, black and gray.

Motor sets are high in fashion's favor and come in both silk and wool. A splendid set includes muff, tam, sweater and scarf in brushed wool. A scarf of brushed wool is attached to a sweater model of alpaca, flatly woven. Another model is finished with a cuff bottom and has a collar of brushed wool in a contrasting shade. Fringed effects are very pronounced in the newest sweater models. A scarf collar edged with fringe is seen on a handsome brown silk sweater which is finished at the bottom with fringe a half yard deep.

A new sweater is made of a very narrow woven silk braid. There is a rippled peplum and full sleeve just above the cuff, sometimes characterized as a bishop sleeve and a Tuxedo collar. This model fastens by a single button at the waistline.

New Motor Scarfs.

Among the new motor scarfs is one a yard wide and 72 inches long, made with belt attached to convert it into a shawllette. Another very new model is made of loosely woven silken braid with long fringe and made to tie about in surplice fashion.

Gloves always figure largely in the motor woman's outfit and there are some splendid ones offered for her use, which may be heartily recommended. Made from the finest quality kid, the extreme care in its selection, the superior workmanship and ultra style features, creates the finished product which appeals to the well dressed woman. The Kaptain Kidd, Air Pilot, Pirate and Sportiff are among

the reliable Bradford gloves that are especially desirable for motor women. They may be had in black, tan and gray, and come with the knitted wool linings also.

A particularly smart model has a back of very heavy silk, and is equipped with an adjustable strap, so that it may be made to fit tightly or loosely, as the wearer prefers. The Bradford gloves all have that exclusive look which makes them so different from the one of ordinary appearance. They also possess the best wearing qualities and will outwear two or three pair of ordinary make.

One thing which every motor woman should possess is the Vanity Fair Pettibocker. It answers every requirement of the petticoat and the knickerbocker and is one of the most comfortable garments imaginable. It comes finished with a ruffle and has the appearance of a petticoat, but gives the freedom of the knickerbocker and will be much appreciated by any woman in stepping in and from the car. It seems as though it must have been invented especially for the motor woman's use so greatly does it suit her comfort.

It is made of very heavy glove silk and wears admirably. The Pettibockers come in all standard shades and also in flesh color and white.

Toilet Articles.

All motor women are intensely interested in toilet articles, for certainly they are a very necessary part of her equipment. The well groomed motorist is always an object of admiration and respect. Among the many excellent toilet preparations there is none to excel—and in my opinion, to equal, the delightful La Boheme goods. It is also a thought for millady motorist when the fast approaching holiday season arrives, for what could be more charming as a gift to her motoring friends? There is the face powder and talcum powder, which all motor women carry in the motor bag, and also toilet water and perfume.

It is so worthy of consideration that it tends to make the user distinctive and is to be highly recommended. Another excellent combination is the Mavis, well liked by many discriminating women. The Mavis toilet articles have a haunting and alluring odor that fascinates and is never ordinary.

There are some very handsome new motor bags, in silk, velvet and leather. Some have two compartments which permits a woman to keep things separated and handy. They are fitted with mirror and purse to match. There is a vogue of placing a vanity mirror in a wide pyroxlin mounting which is very effective. Set in a bag of gray velvet and having a strap handle of the velvet, the effect is charming. A motor bag of blue Duveteen shows a novel mounting, and opens on each side of the center and affords room for all the little vanity requisites in pockets of their own.

Cars, drivers and ambulances of the Women's Motor Corps of America have been placed at the disposal of the authorities of the Health Department in New York city.

Jay Dewey Now Sales Director for Lexington

The Lexington Motor Co., Connersville, Ind., through the president, Frank B. Ansted, announces the appointment of Jay Dewey as director of sales for the Lexington Minute-Man Six. Mr. Dewey, who formerly was district sales manager for Lexington, already has assumed his new duties. The new director of sales came to the Lexington organization several years ago from the Starr Piano Co. of



JAY DEWEY.
Sales Director for Lexington.

Richmond, Ind., where he was a sales executive. For three years he served as manager of the Lexington branch at Kansas City, returning to the home office of the company to become district sales manager. Mr. Dewey has been interested in problems of salesmanship since he began his business career as a boy back in his home town of Canton, Ill. At present his chief problem lies not in making sales, but in pacifying the Lexington distributors and dealers who are clamoring for deliveries on cars.

SWITZERLAND OPENS HITHERTO CLOSED ALPINE ROADS TO AUTOMOBILES.

The government of the beautiful Canton of Valais has just decreed that all the principal thoroughfares of that Canton will be open to automobilists henceforth. This means that besides the Simplon road and the highway skirting the river Rhone, the following additional passes and roads have now been thrown open to visitors traveling by automobile: The Grimsel Pass, connecting Meiringen with Gletsch, on the Furka Pass; Furka Pass, connecting Brigue with Gletsch and Gletsch with Andermatt on the Gothard route; road from Leuk to Leukerbad—the Baths of Leuk; road to the Mayens of Sion, the valaisan capital; Great St. Bernard Pass from Martigny in the Rhone Valley to the Hospice; road from Sembranches, on the Great St. Bernard route,

to Chable in the Bagnes valley; road in the Val d'Illiez to Champéry and Troistorrents.

Automobilists are thus given an opportunity to conveniently visit some of the many exquisite sections of the Valais within a short time. The Simplon road, conceived by Napoleon Bonaparte and which was inaugurated in 1806, justly deserves to rank as one of the world's great engineering feats and is moreover one of the finest Alpine roads in Switzerland for automobiles. It is of particularly generous width and exceptionally well kept and affords the traveler views of altogether unparalleled magnificence.

The Grimsel Pass winding its way up to the Hasli valley, the rugged homeland of the river Aare, and the Furka road, either in its entire length or from the meeting point with the Grimsel at Gletsch down to Brigue, again provide memorable impressions of wondrous Alpine scenery and the charm of Swiss peasant life.

Equally attractive and particularly interesting for the great variety of quaint native customs and costumes are the now opened side valleys of the Rhone, each with an individuality of its own, gems, which can only be appreciated after a personal visit.

CONCERN THAT ADVERTISED \$100 AUTOS IS MISSING.

The district attorney's office in New York City is trying to find the officials of "The Anchor Manufacturing Co.," which is said to have had a temporary office in East 42nd street. Edwin T. Kilroe, assistant district attorney, said that he was anxious to find out why a number of persons who had forwarded money to the concern for the purchase of rebuilt Ford motor cars had never received their automobiles. Thirty complaints against the company have been received, Mr. Kilroe said.

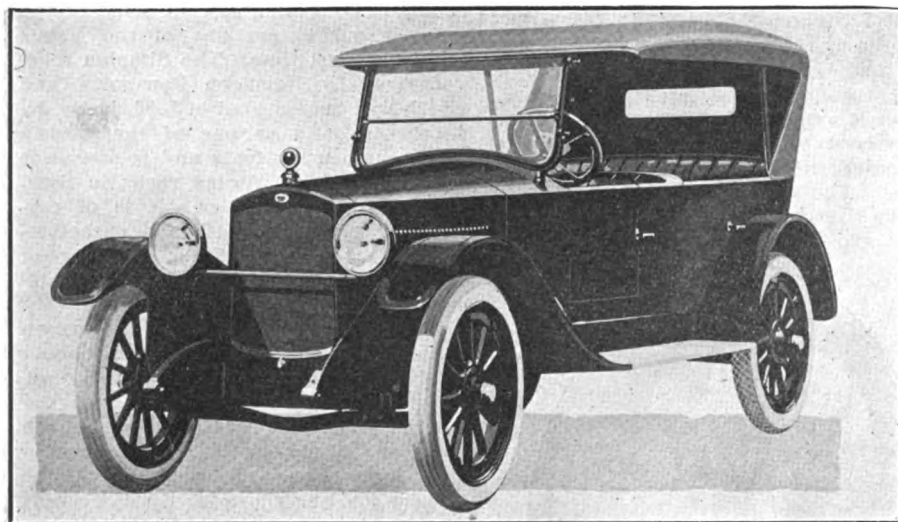
Dr. M. M. Cloud, Kingsport, Tenn., sent to the district attorney's office a letter he received from the Anchor company. Mr. Kilroe said that this letter was similar to circulars sent to medical men all over the country. The letter stated that the Anchor company was going to offer a number of rebuilt Ford cars to physicians for \$100, of which \$50 was to be paid in advance.

The company was prepared to accept Liberty bonds in lieu of cash, the letter announced. Dr. Cloud sent \$50 and never heard further from the company.

BIG PRICE FOR HAIG'S CAR.

Three thousand six hundred guineas were paid for the motor car used by Field Marshal Haig in France. The car was one of a number sold at auction by order of the British Ministry of Munitions, which is disposing of surplus army stocks. The purchaser was a wholesale confectioner, who, with a keen eye to advertisement, intends to send the car to his stores in various parts of England so that the public can see the historic vehicle.

Entirely New Light Six Model Is Grant's 1920 Offering



New Grant Light Six Touring Car.

AN ENTIRELY new Light Six model with longer wheelbase, a wider power range and flexibility, more artistic lines and greater comfort and luxury for passengers is offered by the Grant Motor Car Corporation of Cleveland for 1920. While the light weight principle which has characterized Grant cars since their inception is adhered to closely, the added power and size of the new model marks the entrance of the Grant Light Six into an entirely new field with a wider range of possibilities.

Inspection by dealers of the new model has met with such large demands for the coming season that the Grant corporation announces increased manufacturing facilities to involve a doubling of its output and a production for 1920 of 20,000 cars. The corporation is adding another story to its large Cleveland plant and has acquired adjoining property to facilitate its extension policy. Work upon these improvements is being rushed to completion.

In appearance the new Grant combines the rakish lines of the sport model with the comfort and roominess of the five-passenger touring car. Its long, low, straight lines merge gracefully into the bonnet. The new style radiator is imposing in appearance and in complete harmony with the body lines.

The top is of "Neverleak," well designed and of sturdy construction and includes door opening curtains and single plate glass window in the rear.

Upholstery is of genuine leather, luxurious and comfortable. Inside trimming is finished with leather covered mouldings.

The steering wheel is 18 inches in diameter, notched and made of mahogany. The wheel carries spark and throttle control. The instrument board is also finished in mahogany.

In addition to the accessories usually furnished the Grant equipment includes Kellogg power tire pump and Boyce motor.

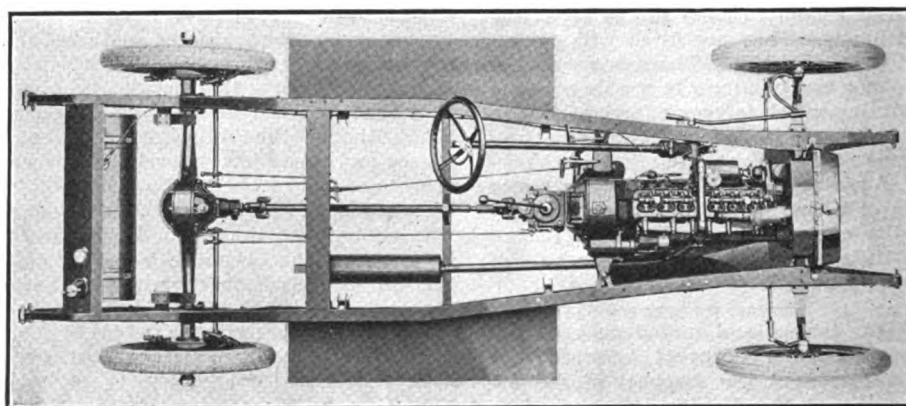
The designers have given the new Grant Light Six a powerful, compact,

clean and accessible motor. It is of the six-cylinder, overhead valve type, $3\frac{1}{8}$ by $4\frac{1}{2}$ inches, bore and stroke with balanced crank shaft or extra large dimensions and a force feed oiling system, insuring perfect lubrication. It is equipped with Stromberg carburetor, Stewart vacuum and two-unit starting and lighting system. There are many features about the motor that contribute to lightness and its makers claim for it new standards of performance with plenty of power for hill climbing and speed as well as a splendid reserve power at all times. The motor is quiet and responsive.

The rear axle is the Columbia floating type with 12-inch equalized brakes. The housing is one-piece and of exclusive design, which is claimed to be 50 per cent. stronger than the conventional two-piece housing. Brake connections are permanently lubricated. The drive is the Ideal Hotchkiss.

The front axle is of drop forged, I-beam construction with extra strong steering connections. The steering gear is irreversible; continuous tube with connections bushed.

The motor is spark and throttle controlled and the gear shift lever is extra long with standard S. A. E. shift. The clutch is the 10-inch Borg & Beck disc.



New Grant Light Six Chassis.

Unusual spring suspension is offered in the new Grant, giving the car its easy riding qualities. The front spring is 38 by two inches and the rear 56 by two. Both are semi-elliptic with the rear springs underslung and with permanently lubricated bushings.

The transmission gives three forward speeds and reverse and Spicer universal joints are provided. The speedometer drives from the transmission.

The radiator is of reinforced double-shell construction with removable core and is mounted on trunnions.

The body is bevel edged with semi-bright finish. The body finish is of Grant blue with black guards and fenders and nickel door handles. Wheels are of wood, white striped. Tires are 32 by four.

In addition to the touring car there are offered in the Grant Light Six a four-door sedan, a four-passenger coupe and a three-passenger roadster.

The price of the five-passenger touring car and the roadster is \$1495. Prices on the enclosed models will be announced later.

Summarizing, the makers of the new Grant Six claim for it greater power, a larger and more artistic car, easier riding qualities because of the unusual spring suspension, flexibility and economy in operation.

Grant Light specifications are as follows:

Engine, six cylinders, overhead valve type, bore and stroke $3\frac{1}{8}$ by $4\frac{1}{2}$. Stewart vacuum system. Wheelbase, 116 inches. Transmission, three speed, tubular propeller shaft. Spicer universal joints. Clutch, Borg & Beck, 10-inch disc. Springs, semi-elliptic. Front springs, 38x2; rear springs, underslung, 56x2. Permanently lubricated bushings. Electrical equipment, two-unit.

WARM ENGINE WITHOUT RACING.

A cold engine should be warmed slowly, as there is probability of damage if one races or accelerates an engine before it is heated. Engine racing does more harm than constant service under a full load at normal engine speed. Where this instruction is disregarded you are inviting trouble, repairs and expense. Excessive engine speed not only loosens the bearings and the engine supports on the frame, but will cause damage to the cylinders, pistons, rings, generator and the other units.

NATIONAL AUTO SHOWS ARE TO BE LARGEST EVER HELD.

Several important factors combine to indicate that the national exhibitions of the automobile industries the coming winter will be the greatest in the history of these enterprises.

The holding of the displays of the two departments, passenger and commercial, at the same time will insure a greater attendance of dealers and prospective buyers. The manufacturers will have a greater variety of improvements to exhibit than for many years, and there will also be important additions to the family of exhibitors.

Then, too, for the first time in history, ample housing facilities have been provided, this condition having been brought about by the addition of two of the largest structures of their kind in the world to the list of buildings heretofore occupied. It will, therefore, be possible to hold, for the first time, passenger and commercial departments of the shows the same week, both at New York and Chicago. The Grand Central Palace will be available for the passenger car section of the New York show.

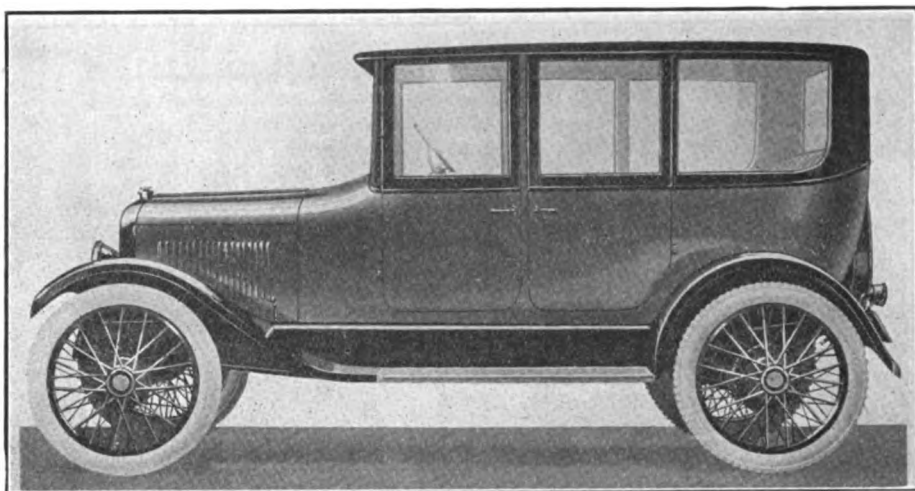
By reason of the added space the exhibits will be more comprehensive than formerly. The unprecedented demand for cars, aside from all other considerations, indicates a record attendance, and the management is already assured of the presence of buyers from abroad.

The dates and places are as follows: Jan. 3-10, 20th annual exhibition of passenger cars and accessories, Grand Central Palace, New York; Jan. 3-10, national exhibition of commercial cars and accessories at Eighth Coast Artillery Armory, Kingsbridge road, New York; Jan. 24-31, 20th annual national exhibition of passenger cars and accessories, Coliseum and First Regiment Armory, Chicago; Jan. 24-31, national exhibition of commercial cars and accessories, International Amphitheater, Chicago.

There will be no important changes in the plans for the passenger car shows except that the exhibits will be confined strictly to passenger cars and their accessories. All exhibits connected with commercial cars will be limited to that department.

The Eighth Coast Artillery Armory is reached by elevated road from 42nd street and Sixth avenue or by subway.

Three Point Cantilever Springs in New Overland Four



Overland Four Sedan.

THREE point cantilever springs are used in the new Overland Four.

The actual creation of this car began two years ago, and back of its development stand 10 years of successful manufacturing and engineering experience in giving the public good motor cars.

For the immediate development and production of the Overland Four, John N. Willys has concentrated the vast resources of the Willys-Overland Co. The springs on the new car extend 15 inches from a point on the chassis beyond the axles at front and rear, giving a wide diagonal shape to the springs. The car has an actual spring base of 130 inches, although the car wheelbase itself is 100 inches. Each spring flexibly responds to its task of keeping the body a constantly even keel.

The car is assembled from five units only and the chassis is clear of all involved mechanism. The entire assembly requires only 50 bolts. The engine is a four-cylinder, block cast, with removable head and four-point suspension. It is water cooled, of the L-head type, with poppet valves in the right side pocket. The bore is $3\frac{3}{8}$ and the stroke four, with 18 S. A. E. horsepower and 27 actual.

There are three crankshaft bearings.

The lubrication is constant level splash, with centrifugal oil pressure from periphery of flywheel to main crankshaft bearings. Ignition is by battery with induction coil and distributor. For starting and lighting there is the Auto-Lite two-unit, six-volt system. The gasoline tank has a capacity of 10 gallons, and is located under the cowl.

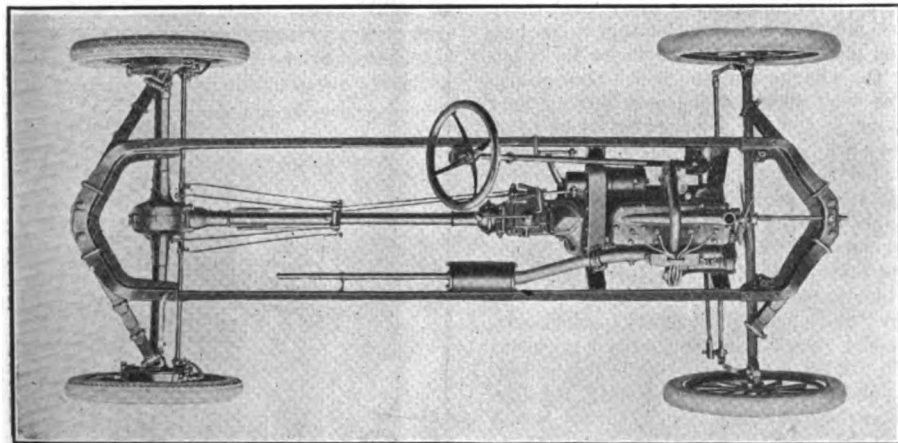
Other general specifications are: Carburetor, Tillotson, $\frac{1}{4}$ -inch special, with hot air adjustment and stove over exhaust manifold; cooling system, thermosyphon, with cellular type radiator; clutch, single plate, floating ring type, eight-inch diameter, operating in oil; tread, 56 inches; transmission, selective type, three speeds forward and one reverse, unit with engine; front axle, drop forged, I-beam section; rear axle, $\frac{3}{4}$ floating type, spiral bevel gears; gear ratio, $4\frac{1}{2}$ to 1; brakes, foot contracting $1\frac{1}{2}$ inches wide, hand expanding $1\frac{1}{4}$ inches wide, acting on 10-inch brake drums; clearance, front axle, $11\frac{1}{4}$ inches; flywheel housing, $12\frac{1}{4}$ inches; rear axle differential housing, $9\frac{1}{4}$; springs, three-point cantilever suspension in front and rear; steering gear, planetary type, 16-inch wheels.

The Overland Four will be marketed in four body styles, a sedan at \$1375; a coupe at \$1325; a touring car and a roadster at \$845 f. o. b. Toledo.

COVERT GEAR COMPANY'S NEW MANAGER.

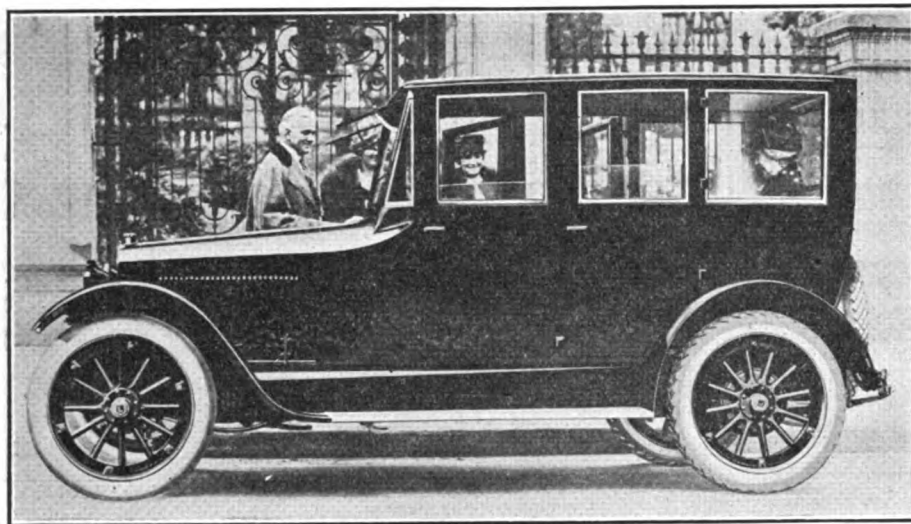
Alwin A. Gloetzner, formerly vice president of the Covert Gear Co., Inc., Lockport, N. Y., in charge of sales and engineering, has been chosen president and general manager of that company, succeeding P. A. Clum.

Opinions differ as to the value of the four springs used to hold the chains from sagging. If they hold the chains from creeping they are harmful, but if they are properly fitted they are a decided benefit.



Chassis of New Overland Four.

Despite Many Refinements, Prices on New Liberty Sedan and Coupe Are Reduced



The Liberty Sedan for the 1920 Season.

THE new Liberty line consists, as heretofore, of a sedan, a coupe and a brougham. The outstanding fact about these cars is that while in every case their construction shows considerable betterment, chiefly in body design, the prices on two models, the sedan and coupe, have actually been reduced.

Of the three models the greatest change is noticed in the coupe. This car has been given the slanting windshield by projecting the lower part of the windshield frame a few inches forward, similar to the method observed first on the sedan. This improvement adds some space to the front compartment, and, as is true in all windshields when the slant of the glass is correct, it prevents glare from being thrown into the driver's eyes. It also allows the driver a better view at either side through the inverted V-shaped glass which connects the windshield with the body proper.

The sedan is of the four-door type. The buyer is permitted to choose the uphol-

stery he prefers from three different shades of high grade broadcloth, which are matched by three different exterior colors. All windows can be lowered into the body, or the doors, with the exception of the window at the rear.

Coupe Is Graceful.

The Liberty coupe is graceful, and has proved to be a favorite among women drivers. There are seats in the car for four persons. Two are accommodated on the roomy passenger's seat, which is just a trifle to the rear of the driver's chair, and a fourth passenger on the auxiliary seat, which folds away under the cowl when not in use.

The Liberty brougham remains a distinct and striking example of the exclusive town car. There is room in the passengers' compartment for five persons. An innovation noticed on all the new Liberty models is a new headlight of a unique shield shape, similar to the Liberty trade mark. All models are mounted on the Liberty standard chassis.

AMERICAN BRANCH OF RENAULT GETS TWO SHIPMENTS.

The American branch of Renault of France, 719 Fifth avenue, New York, has received two shipments of complete cars direct from the factory at Billancourt, Seine, France. The continuity of these shipments is assured and new Renault models are offered for delivery this month. New features in the Renault post-war cars include: A silent, single unit S. E. V. starting system attached to the crankshaft at the front of the motor, making the starting dynamo very accessible; Monobloc type motors in the 12 to 18 horsepower and the 18 to 30 horsepower models. All motors have a three-point suspension attached to the chassis frame instead of the former method of attaching motors to a sub-frame, and a new automatic carburetor with the flange attached direct on the cylinder casting.

DON'T YELL AT THE FELLOW WHO BURNS HIS LIGHTS IN DAY TIME.

Many motorists do not know that there is as much danger in letting their batteries get overcharged as there is in letting the charge run too low. Overcharging is very likely to happen during long runs when the car is operated at 20 to 25 miles an hour for a number of hours continuously. At this speed the generator is delivering current to the battery at its maximum charging rate, according to F. S. Armstrong, sales manager of the Vesta Accumulator Co., manufacturer of Vesta storage batteries.

An overcharged battery overheats, with the result that the active material in the plates loosens and falls to the bottom of the battery, shortening its life. Most cars have an automatic cutout in the electrical system, which is supposed to prevent overcharging, but this, like many

automatic devices, sometimes fails to work at the proper time.

The safe way is to burn your lights, at least part of the time, when on a long drive. This takes the load off the battery and insures against overcharging.

The next time you see a motorist driving along the street at high noon with his lights on, don't yell at him. He probably knows what he is doing, and his battery will last longer than the other fellow's who is not wise enough to take this precaution.

This idea is one which motorists would do well to adopt. In fact, most automobile manufacturers advise this procedure in their instruction books which, apparently are seldom read carefully.

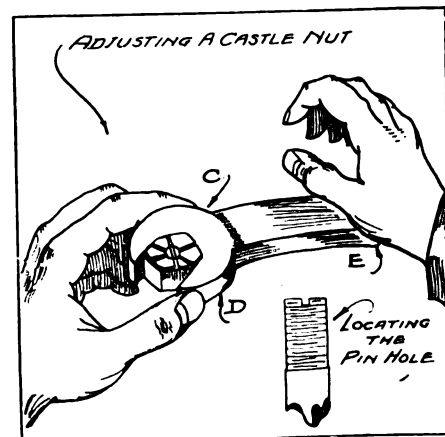
AMERICAN SIX \$3,000,000 DEAL.

One of the largest automobile deals of recent months was recently completed in New York when P. W. Hansel, vice president and supervisor of sales of the American Motors Corporation, and C. B. Penney, president of Penney & Long, Greensboro, N. C., signed a contract covering the general distributing rights of the American Six in North Carolina, Virginia, Tennessee, Georgia, Alabama and other southern territory. The contract calls for the delivery of 2500 American Six automobiles during the next 12 months and the total sum involved is in excess of \$3,000,000. In order to handle the distribution of this large number of cars, Penney & Long will erect a \$100,000 building in Greensboro, and will maintain extensive plants at other distributing points.

METHOD OF ADJUSTING CASTELLATED NUTS.

A simple method of adjusting castellated nuts is when the cotter pin opening has been located, cut a slot across the head of the bolt with a hacksaw, parallel to the cotter pin opening. When the castle nut is turned down into place the slot will show the location of the cotter pin hole and the cotter pin is easily inserted. Otherwise much time may be lost in locating the hole, which may be filled with grease and dirt as the nut is turned down.

The illustration shows the method of marking clearly and the cut is self-explanatory.



Adjusting Castellated Nuts.

DON'T MONKEY WITH SOMETHING YOU DON'T UNDERSTAND.

J. H. Shoemaker of the Ericsson Manufacturing Co. sends the following clipping to the Electric Service Auto Co. with the comment that he thought it so good it could well be passed on to others:

We know a great deal about an automobile. For instance we know that if you put gasoline in the tank and then press the starter button, the car is very apt to start. But that is the extent of our knowledge. We added to it yesterday by learning that when you don't know what you're doing, it's a bad plan to meddle. We're sure of it now. It happened like this: We got into the machine and pressed the button, but nothing happened. We kept on pressing and nothing kept on happening. Then, with a wise look, we got out and lifted the hood and poked and prodded and opened things and peered inwards. Pretty soon we saw two little doo-dads that were about a thirty-second of an inch apart. "Aha," we said, "there's the trouble. Those ought to be touching." So we got many tools and finally made them touch. Fine. And the car started—just like that. In about a mile it quit permanently, and we sent for help. The man came and he poked and prodded around, and at last he found the little doo-dads we had pressed together, and says he, "However did them things git like that? The heat of the electricity has melted them together and burned out the dingus and scorched the what-not, and I'll have to send to the factory for new parts." We didn't tell him how they got that way, but we did make up our mind to leave things alone that we didn't understand. Behold us as the horrible example.

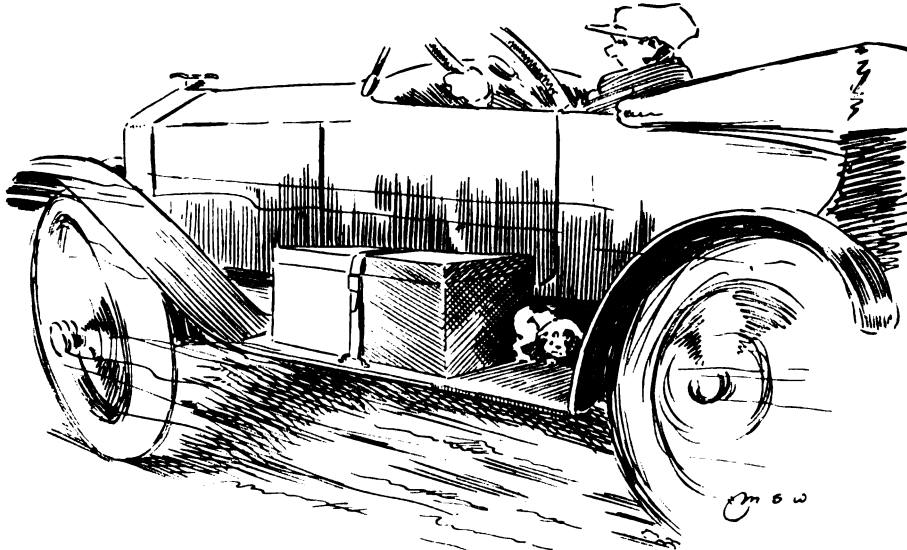
A New England police court judge, on the ground that the dollar is worth only one-half what it used to be, has doubled the amount of his old fine for speeding.



PROOF POSITIVE.

Wife—I think that chauffeur was under the influence of liquor.

Husband—I know that he was. He gave me positive proof of it when he handed me back the correct change from that five-spot.



The Stowaway.

'T WAS ONLY A MINOR PURCHASE FOR THE MOVIE STAR.

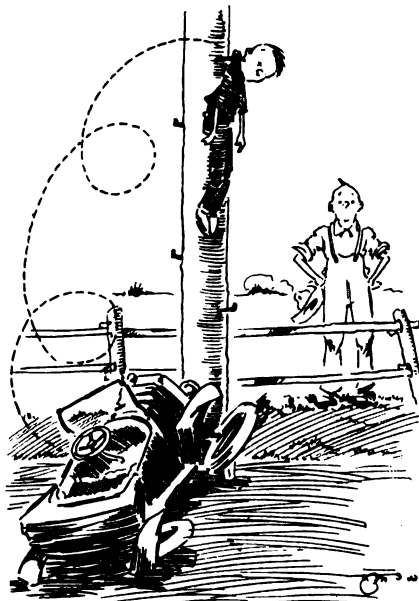
"O, dear," sighed the movie star, "I forgot something when I was down town shopping!"

"What was it?" inquired her secretary.

"I meant to buy an automobile to match my new hat."—Pittsburgh Post.

NEVER LEARNED.

A Milo man bought an automobile and after having received what he supposed was adequate instruction he started out for himself. He had driven about half an hour when he ran up against a telephone pole. "What did you—lose control of it?" someone inquired. "No," replied the novice. "I never had control of it."



THIS LAWYER LOOKED FOR FACTS AND HE GOT 'EM.

Lou Guernsey was defending one party to an auto collision and was cross-examining a lady witness who was undeniably pretty.

"Have you any idea what caused this accident?" thundered Lou.

"I think so," said the fair witness, sweetly.

"Then tell the court how it happened," thundered Lou, eager for facts.

"Must I tell the truth?"

"You have sworn to do so."

"Well, sir, I was standing on the corner and that gentleman turned to look at something and ran into the other machine."

"Ah," divined the astute Guernsey. "He turned to look at you. That makes you an accessory before the fact, madame."

"I—I think it was the—the accessories he was looking at," murmured the witness.—Argonaut.

The traffic court judge is the most unpopular member of the auto club.

A PROFITABLE FARM SIDE LINE.

A motorist got stalled in a tenacious mudhole. While making a vain attempt to escape, a boy appeared with a team of horses.

"Haul you out mister?"

"How much do you want?"

"Three dollars."

After a long and fruitless argument the motorist was pulled to dry land. After handing over the money the motorist said: "Do you haul many cars out in a day?"

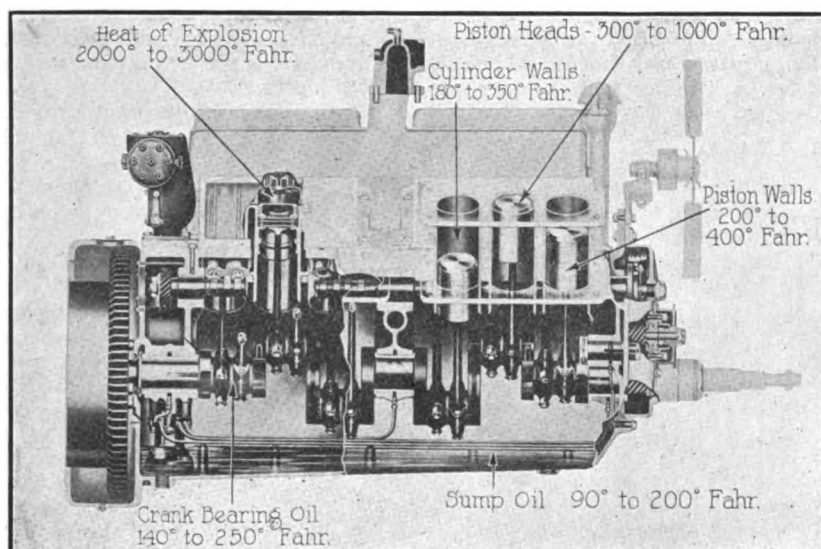
"I have pulled out 12 today."

"Do you work nights, too?"

"Yes; at night I haul water for the mudhole."



HOW TO FIT NEW RINGS TO THE PISTON



Relative Temperatures of an Internal Combustion Engine Working Under Load.

THE piston, together with its attached piston rings, is one of the most important members of the internal combustion engine. When heavy work is being done the piston and piston rings should be removed at least once a year for cleaning and such adjustments as may be necessary.

It is essential for an internal combustion engine to have proper compression. If the inlet valve of an engine should be unseated when the piston is at top center a fresh fuel vapor charge will enter the clearance, or compression space, until the internal pressure within is equal to the atmospheric pressure without the cylinder. This condition will give equal pressure within and without the compression chamber.

In actual practise the inlet valve of the four-cycle engine remains open during the time that the piston passes from top center to bottom center—in other words, for the length of its stroke and for a small fraction afterward. At the moment the inlet valve is closed and the piston is on the up-stroke, a volume of fuel vapor has entered equal to the piston displacement and practically equal to the atmospheric pressure. The ascending piston, aided by the piston rings, compresses the charge to about one-fifth its initial volume and raises the pressure within the compressed space to several times that of atmospheric pressure. Consequently we speak of this as the compression stroke, or compression.

When a volume of gas or air is compressed suddenly, heat is generated. The higher the pressure of compression, the greater the heat generated.

Temperature of 2700 Degrees.

Compression values in all engines are brought to the highest point possible without causing the fuel mixture to ignite from the heat of compression. Gasoline, being a very volatile fuel and easily ignited, does not have so high a compression value without pre-ignition, as California engine distillate, naphtha, kerosene or tops. Engines using gasoline as fuel have a compression pressure value

of about 50 pounds to the square inch. California engine distillate and naphtha are employed at a compression value of about 70 pounds, while kerosene and tops will range from 80 to 100 pounds without pre-ignition.

When an internal combustion engine is in operation it is estimated that the temperature of the burning gases during a certain portion of the explosion stroke is about 2700 degrees Fahrenheit. The head of the piston is directly exposed to this temperature for a small fraction of time every second revolution, and a part of the heat given to the piston head is gradually transferred to the body of the piston. The rest of the heat is sent to the cylinder walls and thence to the water jackets.

Because of this increase of temperature and the expansion attendant upon it, some other provision has to be made to have the piston maintain gas tightness. To effect this condition piston rings are placed in the slots of the piston so that they expand against the cylinder walls and top and bottom edges of the piston slot to prevent the gases from escaping past the piston. The piston itself cannot be made an absolute fit in the cylinder, because provision has to be made to take care of the expansion that occurs under the high working temper-

ature to which it is subjected. The expansion of the piston is taken care of in two ways:

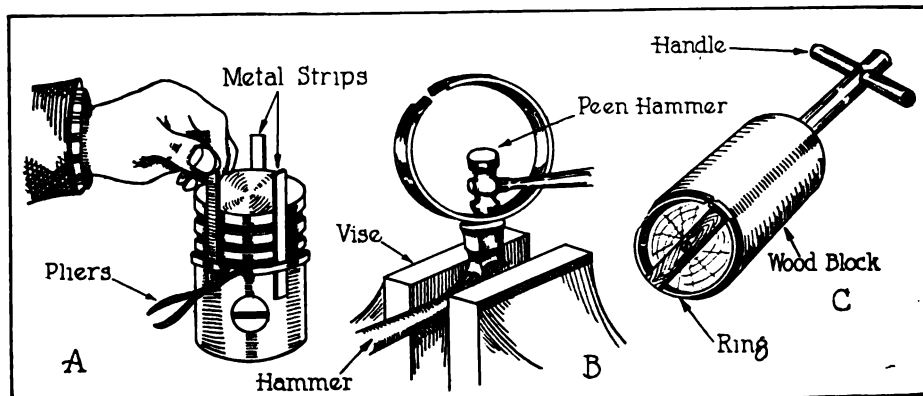
First, the piston is tapered from the bottom of the last piston ring slot to the top of the piston. This makes the top part of the piston conical shaped and takes care of the expansion of the part that is in direct contact with the heat of the explosion.

Second, the body of the piston is made 1/1000 of an inch smaller for every inch of diameter of the cylinder that it has to fit. From the bottom of the last piston slot to the bottom of the piston, the piston walls are absolutely parallel. When the working temperatures expand the piston it finally fits the cylinder with a sliding fit. The film of lubricating oil occupies the clearance between the piston and the cylinder wall and is the final seal to retain compression. At the bottom of the piston shallow grooves are cut to carry the oil up to the piston rings.

Piston Ring Slots.

Piston ring slots are cut in the piston from 5/16 to 7/16 of an inch in width, depending upon the size of the engine. These slots are accurately cut at right angles to the axis of the piston and are usually not allowed to vary in width more than 1000 of an inch. Great care should be exercised that loose piston rings are not allowed to wear the square faces of the piston slot to a bevel, as if this occurs it will be impossible to prevent the passage of gases from above and below the piston ring and the edges of the slot. When a piston ring is inserted in the piston slot it should be free to move horizontally in the slot, but having a slight drag, and the vertical movement should not be much greater than 1000 of an inch. When the piston ring expands in the vertical direction it will just about close this clearance, and the oil film will act as the final seal to prevent the gases from going behind and around the piston ring. This point is as important as the fit of piston ring against the cylinder wall.

Several forms of piston rings are made for internal combustion engine use. In manufacture, for truck use, most piston rings are made eccentric—that is, the centers of the inside and outside diameters of the piston ring do not coincide; thus one part of the piston ring is thick-



A—Method of Removing Piston Rings. B—Peening a Piston Ring. C—Device for Testing and Fitting Piston Rings.

er than the rest. This eccentricity keeps the ring in its circular shape and prevents distortion when the piston ring is put into the piston slot; also, it gives uniform pressure of the piston ring against the cylinder wall. When the groove is completely closed the center of the outside diameter of the piston ring is on a true center with reference to the cylinder.

Piston rings are made from selected, close-grained cast iron.

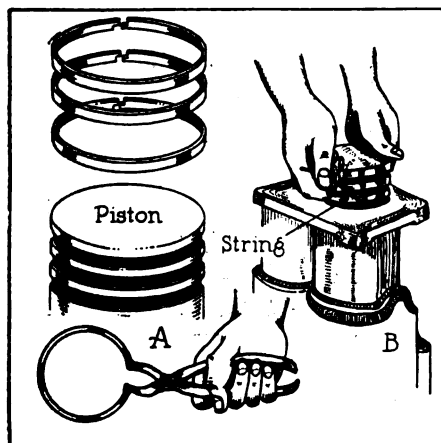
Accuracy and care should be exercised in fitting new piston rings in a cylinder. Two factors have to be taken into consideration: First, the fit of the piston ring in the cylinder before placing it on the piston. Second, the fit of the piston ring in the piston ring slot.

The average truck owner should be able to get a perfect adjustment on new piston rings if some precautions are observed. With a fine file remove any rough or "wire" edges that may come in contact with the cylinder walls. Fit the piston ring to the cylinder. Allowance has to be made for the piston ring expansion, consequently the edges in the split in the piston must not meet snugly when the new ring is tried in the cylinder.

Fitting Ring to Slot.

The amount of the clearance between the edges of the split in the piston ring should be determined from the manufacturer of the truck. The amount of the separation of the split varies for the different size engines, and, in addition, the separation of the split in the top piston ring is nearly twice that allowed for the second and third rings. Piston rings fitted too close in the split will usually result in broken rings or broken lap joints. A small mirror is a convenient aid in inspecting the piston ring while it is being fitted into the cylinder.

The second operation in fitting new rings is to fit the piston ring to the piston slot. The piston ring slots should be scraped absolutely clean of carbon deposits and washed off with kerosene. Fit the piston ring to the piston slot by first revolving on the outside of the piston. If the piston ring does not have free movement in the slot some material will have to be removed from the ring. This removal has to be carefully done and is accomplished as follows: Obtain a flat

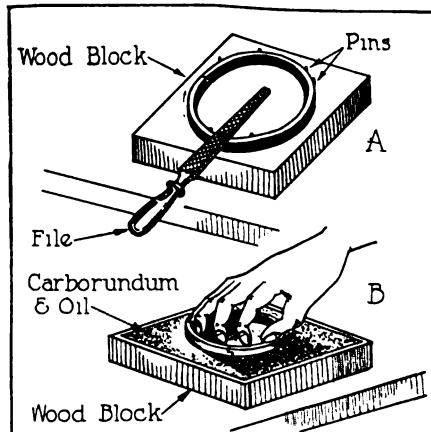


A—Piston Ring Pliers for Expanding the Rings Over the Piston. B—Method of Replacing Piston in the Cylinder with a String Holding the Ring in Its Groove.

board, over which spread a quantity of carborundum powder and heavy oil mixed into a paste; lay the piston ring flat on this mixture, and rotate till a sufficient amount has been removed to allow freedom of movement in the slot. Wash the ring with kerosene before fitting in the slot. Never use emery for this operation.

One of the most convenient tools for removing and inserting piston rings is a pair of piston ring expanders. If this is not available three metal guides should be provided, each a quarter of an inch wide, 1/16 of an inch thick and about five inches long. In taking off or inserting rings these guides should be equally spaced round the piston and underneath the ring. Care must be taken not to force the piston ring and spring it out of true.

Piston rings have hard work to do and they must receive sufficient lubrication. An oil must be provided that will withstand the high temperatures occurring within the cylinder, and of sufficient body at working temperatures not to pass the piston rings freely. If carbon is allowed to accumulate under the piston rings it will gradually build up and eventually



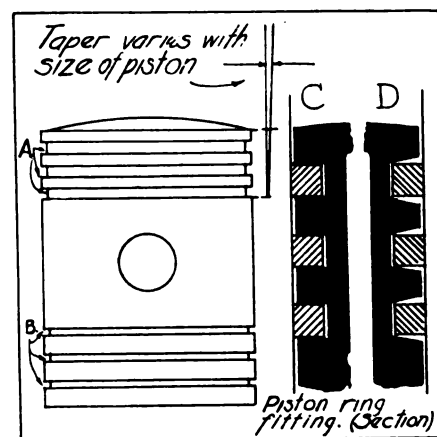
A—Simple and Effective Means of Holding a Ring for Filing. B—Method of Dressing or Lapping Piston Ring to Fit Groove in Piston.

stick the piston ring in the slot. This will result in a broken ring when removal is attempted.

In addition, a stuck piston ring will wear the cylinder out of round and may result in scoring either the piston or the cylinder. A piston ring being broken when the engine is under load usually indicates that sufficient clearance was not allowed between the edges of the split in the ring, and the ring broke through expansion against itself. A broken ring may be due to rough handling or forcing the ring when inserting it on the piston, causing a weakness to develop.

Why Piston Rings Wear Out.

Undue wear on piston rings has its origin in two main causes: First, entrance of dirt through the carburetor in the form of field or road dust; second, insufficient lubrication. Dust that enters through the carburetor acts as a grinding compound when it becomes incorporated with the oil film on the cylinder wall. The top piston ring acts as a scraper in accumulating the charred portion of the oil film on the cylinder wall



A—Piston Ring Grooves. B—Oil Grooves. C—Correct Method of Fitting Rings. D—Incorrect Method of Fitting.

on the exhaust stroke, and the presence of dust will cause rapid wear. This undue wear can be prevented by using a dry air cleaner or moisturizer to filter the air before entering the carburetor.

Scoring of the pistons and cylinders may be divided into two general classes: First, scoring due to lack of sufficient lubrication; second, that due to mechanical causes. Scoring due to lack of sufficient lubrication can be charged against poor bodied oil, or wrong quality; oil level in splash system too low; too low pressure system or dirty oil.

Mechanical causes of scoring may be: Failure of the water circulation system; piston pin getting loose from its position; stuck piston rings or clogging up of cylinder water jacket with sediment. Lubricating oil was never designed to take the place of the cooling system. Heat must be absorbed by the circulating system to prevent the oil from breaking down.

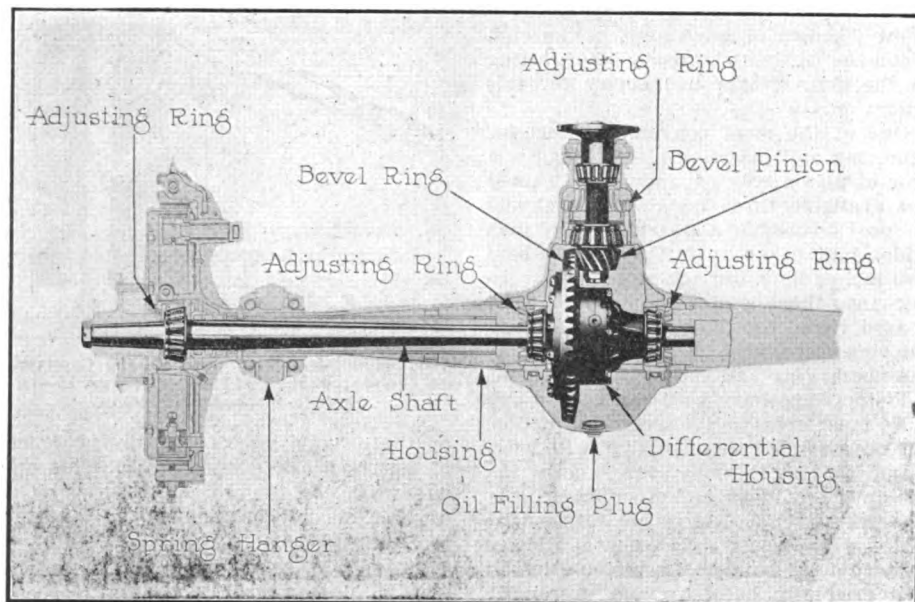
RAILWAYS OBJECT TO AUTOMOBILE TOURIST COMPANY.

Application for approval of a charter for the first "sightseeing" automobile tour company to come before the Pennsylvania Public Service Commission brought objections from the Philadelphia Rapid Transit, Lehigh Valley Transit, Stroudsburg Traction and Easton Transit companies. The applicant is the National Auto Tour Co. of Nazareth, which proposed to run tours from Philadelphia to Delaware Water Gap and pick up passengers along the road and to carry persons to and from work. The railway companies contend that there would be no schedule and that it would be a new kind of common carrier. Objection was also made to any freight handling.

CHURCHILL DRIVES FORD.

As a result of the economy campaign in England, several ministers have given up cars placed at their disposal by the state during war time. Winston Churchill, whose favorite automobile fetched a big price at auction, now travels around in a Ford, and Lloyd George himself is using a car which is his private property.

HOW TO TAKE THE GROWL AND OTHER NOISES OUT OF THE REAR AXLE



Studebaker Rear Axle Showing Timken Bearings and Adjustments.

HAVE you a "dog" concealed somewhere about the rear axle of your car—that is, something that growls? Some cars go along without a bit of unwonted noise, while others have a distinct hum, or growl, or, even at high speed, a decided scream. How about your car? Ask your neighbor, for sometimes persons on the sidewalk will hear it even if the driver does not suspect it.

Occasionally a repairer will be asked to locate a grind in the clutch of a customer's car. It may be noticed that at certain speeds a sound will be emitted that will lead the repairer to believe that a bearing is dry or worn out. An inspection of the clutch will probably fail to reveal the trouble, but jacking up a rear wheel will usually disclose the fact that the noise is coming from the rear axle assembly.

The cause is usually found to be that the gears inside the differential are meshed too deeply. Adjustment in a case of this kind can be made usually from the outside without disassembling the axle. A slight change will ease the trouble and a few trials and adjustments will frequently eliminate the trouble. Noises of this kind are carried by the torque tube or arm and, while they appear to be in one unit, are usually found in another, as the vibration of the rear system is carried by the torque tube or arm.

Locating the Growl.

When a growl is discovered in the rear axle it does not necessarily indicate that the gears are not meshing properly. It might mean a lack of lubrication, which must be determined by inspection. The manufacturers exercise great pains to set the gears so that they run true, mesh properly and operate silently, and it may be assumed that when a car is delivered the adjustment has been made to the nearest silent position. It will stay right unless the adjustment works loose or

the bearings or the gears become worn.

On each side of the differential (master) gear there is a thrust bearing which takes the side thrust caused by the operation of the gears. The bearings sometimes wear and allow the gears to go more deeply in mesh and make a humming sound which is noticeable only when turning a corner, being generally silent at other times. This is because in turning the wheel slides the axle in for the amount of the play, meshing the gears more deeply.

Wear in the thrust bearings on each side of the master gear causes another trouble which makes a clatter rather than a hum or growl when the wear becomes excessive. Then it allows the master gear to move away from the pinion far enough to skip teeth. There will be unevenness of action in this case.

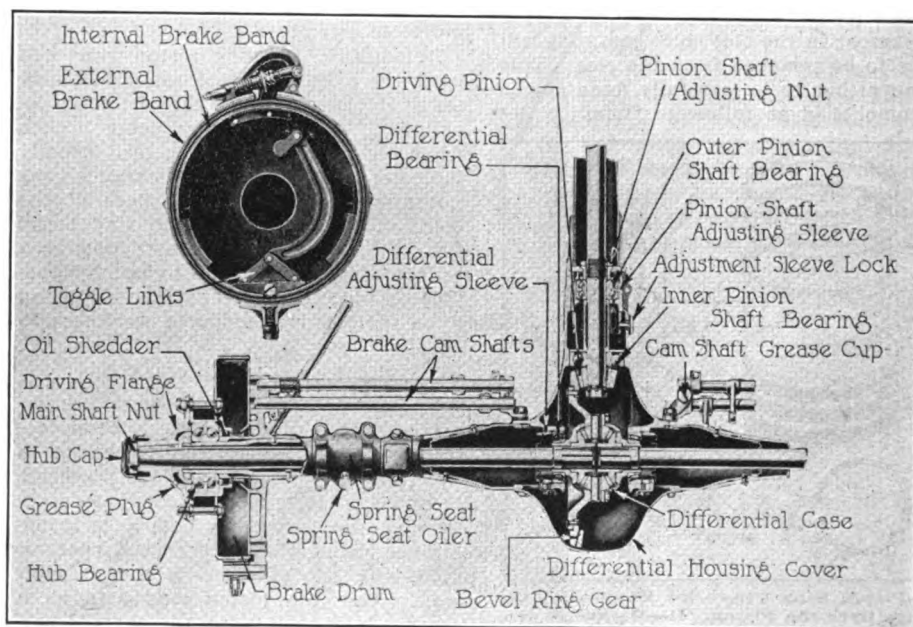
If the gears were permanently out of mesh the car would stop, but the motion of the car would slide the axle in and out so that the gears would mesh for a time and then skip, with resultant clash and so on. The same result would come from uneven wear of teeth.

Wear on Gears.

It should be remembered that where there are gears there usually is wear. Occasionally a set will be made with just the right toughness and hardness, and will last for the life of the car. Others are too hard and if they get a little out of adjustment they will chip off, the chips working among the teeth, breaking off a tooth or chewing up a number, with consequent noisy action. When one tooth is broken there is a decided knock. If the gears are too soft they wear rapidly and gradually come to a knife edge. There is then danger of breaking off under a little extra strain, climbing a steep hill or when the clutch is let in with a jerk.

This latter condition may be determined by jacking up one rear wheel and putting the gears in mesh, then rocking the wheel back and forth to see if there is excessive play. In doing this it is necessary to see what play there is from other causes, such as universal joint play or from loose key in rear axle; the remainder of the play is in the differential. It should not be more than two inches of motion of the outside of the tire.

Recently the writer discovered another cause of rear axle noise, which was difficult to locate, where the key holding the wheel to the axle had become loose and had rocked the key way out of shape. Still another case occurred in a floating type rear axle, connected to the hub by flutings which matched projections on the flange. This was a click which defied detection by the eye or ear, though loud enough to be annoying. Fingers searching for a loose part discovered a very slight motion, and then it was found that flutings and projections had worn enough to permit a slight play. This was so obscured that the service



Weston-Mott Axle Used on the Buick Cars, Showing Ball Bearings and Adjustments.

station experts had been mystified. Persistent search and elimination of one possible cause after another, and a curiosity which led the repairer to use his fingers to supplement his eyes, found the trouble.

Method of Adjustment.

The following method of adjustment may be followed on many axles of the ball or roller type and will be found effective in curing axle noises. The adjustment of the differential gearing and the ring gear is accomplished by threaded adjustment rings or nuts, which bear against the inner race of the ball or roller bearing employed in supporting the differential. These adjusting nuts are provided with a series of slots by which they may be turned and which also serve to receive the tongue of the adjustment lock member. To move the differential gearing it is necessary first to release the adjustment locks and then to turn one threaded adjustment in and the other out until the proper degree of engagement of the gears is secured.

For example, if it is desired to mesh the ring gear more deeply with the drive pinion the adjustment on the right would be slacked off or screwed in toward the differential a certain number of turns, or such portion of a revolution as would be necessary to bring the gears closer together while the adjustment nut on the left is screwed away from the differential the same number of turns in order to keep the bearings on both sides in proper relation. There should be absolutely no back lash in the bearings nor lateral movement of the differential gear assembly. At the same time the gearing should be turned without appreciable effort when the pinion drive shaft is rotated by hand.

HELPFUL HINTS.

When making engine adjustments it is usually necessary to exercise a little patience to get the best results, for the reason that the effects of adjustments are not always instantly apparent. In adjusting the needle valve of a carburetor, for instance, the engine must be given a little time, say four or five seconds, before it shows the effect of the change. This is because there is frequently more or less fluid gasoline in the inlet manifold and so the change in the supply from the spray nozzle does not immediately affect the running of the engine.

If you are in doubt as to which way to turn the needle valve, try choking the carburetor slightly. If the engine accelerates the mixture is too lean; if it decelerates the mixture may be right, but you are making it too rich. If an air valve is accessible, try pushing it open slightly. If the engine runs faster the mixture is too high; if it loses speed the mixture is normal or too lean.

In applying tire chains never use a tool to draw them so tight that they cannot creep. If the cross-grip cannot move to a new position on the tread every time it touches the ground it soon cuts deeply into the rubber and damages the casing.

WHITE AND HOWARD ORGANIZATION SELECT THEIR NEW PERSONNEL



D. McCall White.



E. C. Howard.

ASSOCIATED with D. McCall White and E. C. Howard, who have just taken possession of a large modern plant in Indianapolis for the production of a new passenger car, are several men of long experience and high standing in the motor industry.

Their company, to be known as the Lafayette Motors Co., has been chartered in Delaware with \$4,000,000 capitalization. The president is Charles W. Nash, president of the Nash Motors Co. James J. Starrow, Boston, is chairman, and Messrs. White and Howard are vice presidents.

M. J. Moore is treasurer of the new company. He was formerly connected with the Northway Motors Manufacturing Co., Detroit; he was comptroller of the Chevrolet Motor Co. at Flint, and auditor and later production manager of the Miami Cycle Co. of Middletown, O. He served as captain in the Motor Transport Corps in charge of finance, accounting and settlement of claims under the Motor Vehicle Division.

D. C. Selheimer, works manager for the company, is also just out of service, having served 20 months as a major in the Motor Transport Corps, in charge of the maintenance of motor vehicles. He was associated for five years with the Packard Motor Car Co. of Detroit, holding important positions in the manufacturing of engines and chassis. He went from the Packard to the factory managership of the Hall Motor Car Co. of Cleveland. He later became factory manager of the Houk Wire Wheel Co.

J. W. Applin, chief engineer, came with Mr. White from the Cadillac Motor Car Co., where he was chassis engineer. He spent six years with the Cadillac company and was one of the few men closely associated with Mr. White in the design of the eight-cylinder Cadillac in

1914. In 1915 Mr. Applin designed, under Mr. White's supervision, the 12-cylinder aircraft engine, which was one of the important designs on which the Liberty engine was based. Previous to his Cadillac association Mr. Applin was in the engineering department of the Olds Motor Works, Lansing, and the Maxwell Motor Co., Detroit.

G. B. Spreng, purchasing agent, was formerly purchasing agent of the Otis Steel Co. and assistant purchasing agent of the Winton Co., both of Cleveland, O. He recently returned from France, where he served as a first lieutenant.

Leo N. Burnett, advertising manager of the Howard-White organization, went to the Cadillac company in 1915 from the newspaper field. He became head of the Cadillac advertising department and served in that capacity during the last two years, except for a few months spent in the navy.

J. P. Robertson has been appointed works engineer. After completing his technical education at the Glasgow Technical College, Glasgow, Scotland, he became a marine engineer, testing submarines and torpedo boats for the English government and later for the United States. He comes to Indianapolis from the Cadillac Motor Car Co., where he was chief draftsman for two years.

L. A. Menges, chief draftsman, is another man in the new organization who received his training with the Cadillac company and who was closely associated with Mr. White when he produced the eight-cylinder Cadillac.

W. A. Houser has joined the company as head of the technical division of the sales department. He has been engaged in similar work at the Cadillac company during the last few years, with the exception of several months in the army.

RENEWING DEFECTIVE GASKETS

IN CUTTING crank case gaskets a sheet of heavy wrapping paper should be obtained and a hole made large enough to clear the pistons. The paper is then rested on the crank case flanges and with a ball peen hammer the outer surface tapped all around the edges of the crank case. It is best, however, to first mark the holes for the holding down bolts and insert them to hold the paper in position.

When cutting the corners and also holes for the bolts it is best to use the peen or round end of the hammer. It is not necessary to strike the paper a hard blow, only a series of slight taps being required, when it will be found that the gasket will have a nice clean cut edge and conform exactly to the desired shape.

It does not matter how complicated the shape of the gasket may be if the above suggestions are followed, making a new one will be comparatively easy. There may be difficulty keeping the paper in

obtained in a liquid form it may be made as follows: Fill an open mouth bottle nearly full of flake shellac and pour in alcohol and let the shellac dissolve. This may make a thick solution. To make it thinner add more alcohol. Flake shellac can be secured at any paint or drug store. When using shellac for replacing cylinder head gaskets only the smallest quantity should be used and this should be quite thin. If the shellac is thick, it will be forced out when the head is tightened down and the first explosions will blow particles of it into the valve ports and become this foundation for accumulations of carbon.

Use of Shellac.

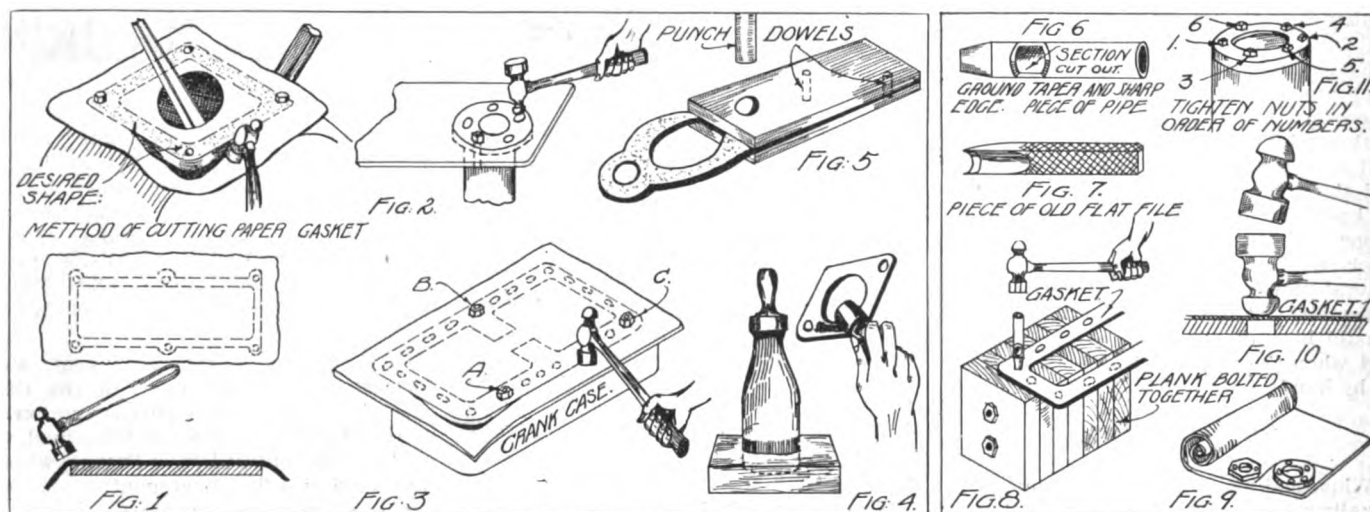
Shellac will insure a tight joint and should be used on one side of the gasket only. Shellac dries quickly and a good way to handle it is to have a wooden plug which can be used both for applying and as a stopper for the jar. A Mason fruit jar, with a hole drilled in the cover

together with a hole or series of holes through which the cutter or dies may be pushed. The gasket material is slipped between the plates and then the die is forced through with a hammer.

Fig. 7 shows a handy tool for cutting gaskets, it is made from an old flat file and may be ground on an emery wheel to the desired shape.

The illustration at Fig. 8 shows a series of sections of plank bolted together to form a block on which to cut gaskets, using punches for cutting. In cutting mobelene or some of the rubber or graphite compounds, which cost considerable, it is wise to get as many gaskets as possible without waste and Fig. 9 shows how the work may be laid out.

When cutting gaskets from metal, asbestos, felt and other material, it is sometimes difficult to cut bolt holes, especially those close to the edge without breaking or tearing. In doing this work use two round headed hammers, placing the



Figs. 1, 2 and 3, Cutting Gaskets on the Edge of Flange or Fitting with a Hammer, the Paper or Other Material Held by Bolts; 4, Shellacking the Gasket; 5, Holding the Gasket with Dowelled Plate to Cut Bolt Holes; 6, Cutting Punch Made from Section of Pipe; 7, Cutter Made from an Old File; 8, Cutting Block Made of Pieces of Plank Bolted Together; 9, Laying Out the Material for Cutting Gaskets; 10, Cutting Gasket Holes with Two Hammers; 11, Tightening Bolts to Insure All Seated Evenly.

place on the crank case, but if the holes for the holding down bolts are first put in and then the bolts inserted as shown in Figs. 1, 2 and 3, this work can be easily done.

When cutting gaskets for gear box covers the same method applies as described, being careful in tapping that the edges will not be broken. Sometimes it is possible to press the paper by hand and make outline indentations deep enough to cut to.

Asbestos Gaskets.

Other gaskets, such as mobolene and asbestos, are made in a similar manner, but are usually marked by pressure of the hand or fingers, when placed over the part to be fitted, and are cut out with a sharp knife or punch. Asbestos gaskets for cylinder heads are sometimes made when nothing else can be obtained. They are usually soaked in linseed oil before fitting in place or they may be coated on both sides with liquid shellac.

Shellac is practically a necessity in any garage or repair shop, and if it cannot be

and a brush fitted in the hole, makes a good shellac container. Bore a hole in a block of wood for the jar to set in and the shellac will not tip over. Fig. 4.

Cutting Stud Holes.

Sometimes the ball from a bearing can be used to good advantage in cutting small holes in a gasket, such as stud holes, and will produce sharply defined edges. In cutting paper gaskets it is advisable to grease the paper first so that it will stick to the surface.

In cutting the stud holes in the ends of gaskets a punch made from a piece of pipe having one end ground down to a cutting edge with a section cut out at the side for the wads to slip out will be found handy. It is difficult to cut holes in gaskets and not have ragged edges. When there are a large number of holes of a given size to cut a guide can be made as shown in Fig. 6. The cutter seen at Fig. 5 can be used to cut holes in gaskets with a guide. This guide is made from two plates of metal doweled

round head of one over the hole and striking with the other, as illustrated in Fig. 10.

For packing water pumps, nothing has been found better than asbestos string, that has been plentifully covered with heavy oil and graphite.

Tightening Cylinder Head.

When tightening a cylinder head, after the gasket is in place and the nuts are loose on the bolts, begin at a nut which for convenience is called No. 1. Draw this down to a loose seat. Then take the nut directly opposite and do the same and continue to tighten according to the numerals, seating them all firmly. The reason for this is that if the nuts are tightened in rotation there would be an unequal strain upon the bolts, but by following the suggestion the nuts will be tightened equally.

After the gaskets are all in place the engine should be run till hot, and the nuts tightened again and it will be found that quite a little slack can be taken up. This is shown in Fig. 11.

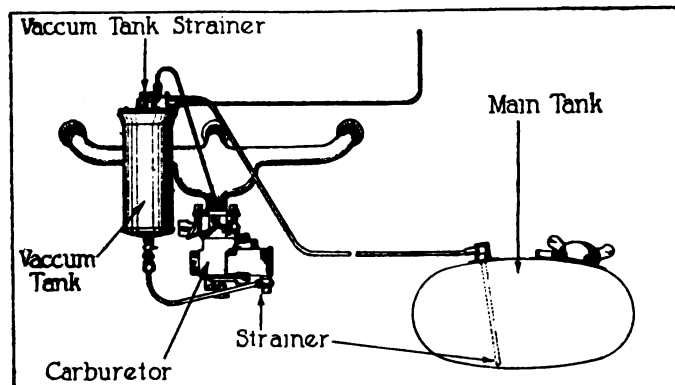
MAKING GRANULATED BRAZING SPELTER.

There are two common methods of preparing "spelter," one by pouring the molten alloy into a tank of water and the other by breaking heated bars in a mortar. In either case the alloy is made in graphite crucibles, there being no difference in this part of the work, the dross being very carefully skimmed off the metal surface before pouring. In the "wet" process the molten metal is poured through a sieve of suitable mesh into a tank and when enough has been poured the water is drained off and the metal dried and graded for size through wire sieves. In the dry process the metal is formed into bars which are heated to the granulating temperature and then smashed up in an iron mortar with a heavy pestle of the same material, reheating being done as necessary. Grading is the same as in the first process.

LOCATING FUEL LINE TROUBLES.

One of the most baffling conditions for the novice to restore is an obstruction in the gasoline line from the main tank to the carburetor. Some carburetors are provided with strainers where the gasoline enters the float chamber, and some cars have a strainer in the gasoline line. One is located on top of the vacuum tank, where the supply from the main tank enters. This is easily removed for cleaning. Sometimes the obstruction may be at a bend in the pipe and is not so easily reached. In such a case the pipe should be disconnected from the carburetor and air forced through it, either with a hand pump, an air line or by blowing. When the obstruction is started the gasoline flow will remove it. Allow gasoline to run out the end of the pipe for a minute or two before connecting it to the carburetor, so that any sediment will not pass into the carburetor or float chamber.

A pipe may be obstructed by lint, chaff, dust, etc., which accumulates on the strainer in such quantity that the flow is gradually diminished, and it is not evident until the driver tries to accelerate the engine to take a hill or pass a car on the level and the engine will not respond. The gasoline will flow fast enough to meet this increased demand. Unless cleaned the strainer fills, causing reduction of power, and backfiring at the carburetor.



Typical Fuel System. Using a Vacuum Tank, Showing Location of Strainers; Remove Strainers Frequently and Clean.

Neglect of Valve Stems Is Injurious; Suggestions for Proper Care of Them

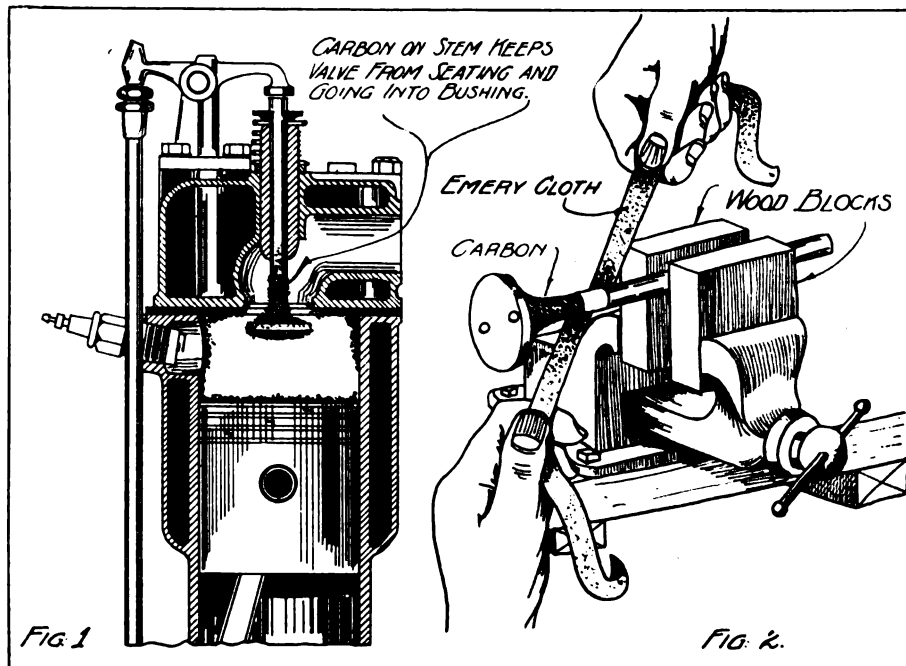


Fig. 1—Result of Carbon Collecting on Valve Stems; Improper Seating of Valve Will Result. Fig. 2—Removing Carbon from Valve Stem Held in Vice, Using a Strip of Emery Cloth.

MANY car owners neglect their valves because the valves are enclosed and they understand the system is so constructed it needs no attention, when in reality more or less care is necessary to keep them in good working condition.

Remove the cover of almost any valve chamber and one will find the valve stems either dry or that so small a quantity of oil is reaching them that it is practically negligible. Some valves are lubricated by a spray and while this may be effective for a time, sooner or later the stems will run dry, cutting the guides and doing other damage. If the valve stem is loose in the guide lack of oil is indicated. No repair can be made except to replace the worn guides, and find the cause of the leak of oil. Possibly the oilways are plugged. Finding these oil-

ways and opening them will restore the lubrication to normal.

Effect of Carbon.

The exhaust valves more than the intakes are subject to valve stem carbonization. Naturally a deposit of carbon on the stem not only cuts the stem and guide, but also prevents free operation of the valve. Owners frequently squirt a small amount of kerosene over the valve stems in the hope of removing the carbon by softening it. The best method is to remove the valve and repolish the stem with a piece of emery cloth. The stem should fit its guide so that the weight of the valve will cause it to fall to its seat and at the same time there must be no perceptible play. There must be some clearance, otherwise when the valve gets hot it will stick in the guide.

While endeavoring to find the cause the float chamber will fill and the engine may be started. This condition is characteristic of a clogged gasoline line. The engine will stop, may be started after a time, but will stop again.

It is well to clean the strainers of the system at regular periods, but the average motorist will wait until the engine failure develops before learning the cause.

Prevention of this condition is advised.

CLEANING AND OILING BELTS.

Belts that have become so greasy and dirty that they slip and fail to transmit power should be cleaned with gasoline, then scraped and afterwards wiped with a brush. In dirty work it is good practice to brush them occasionally with a broom or stiff brush. Castor oil and tallow are used successfully in some shops to prevent slipping and it is good practice to apply these at dressings on a new belt before using.

If you open the relief valves to locate a missing cylinder and fail to see a flame, do not condemn that cylinder. Open the throttle and give it enough gas to fire. When the throttle is closed and the relief valve open the engine sucks in so much fresh air that some cylinders

ATTRACTIVE LITTLE STRUCTURE THAT IS SUITABLE FOR HOUSING OF ONE CAR

Up-to-Date Garage, Built of Wood, Has All Necessary Conveniences for the Private Car Owner, and May Be Erected at Reasonable Cost—Details of Construction and Suggestions for Laying Out and Doing the Work.

THE accompanying design is that of a neat, private garage for one car. The structure is of wood, and the cost would be approximately \$300, varying somewhat in accordance with local labor and building conditions. The foundation is concrete and the roof of wood frame construction.

The size is 14 feet wide by 20 feet long, with a height of 10 feet from the bottom of the rafters to the floor level as shown. Concrete is considered the best material and the most economical for a foundation in a building of this type. The foundation should be built rugged enough to take care of all the loads that may be placed upon it, and in this particular case it is so arranged as to provide for a much heavier building than the one shown.

Placing Foundation.

The first important factor to consider in connection with the placing of the foundation is making sure that it will go below the frost line, so that there will be no damage in freezing weather. The foundation recommended is one foot wide, resting on a spread footing two feet wide and nine inches deep.

In order to insure a perfect foundation, forms should be erected, unless the earth is hard enough to form a fairly good trench itself. These forms should be left in place for at least 48 hours. After the concrete has been poured, the longer the forms are allowed to remain the better will be the results. A good mixture for work of this nature is the 1-3-5 combination--one part Portland cement, two parts sand and five parts stone or cleaned washed gravel thoroughly mixed.

Construction of Frame.

The frame is built of two by four-inch studding erected on a four by six-inch hard pine sill as shown. The studding is about 16 inches on centers stiffened by horizontal framing as shown (see section). The roof rafters are two by eight inches spaced two feet on centers supporting $\frac{7}{8}$ -inch square edged roofers on which is laid a good composition roof, laid up in hot tar and firmly secured by wood battens.

Novelty siding has been used for exterior covering, while a $\frac{1}{2}$ -inch sheathing has been used on the interior. Of course, the interior finish may be omitted, yet the warmth derived from it in winter well pay for its initial cost.

The exterior trim is very plain and simple. On the front and rear ends brackets have been shown, while on the sides the rafters have been allowed to extend over, forming a jet, the ends cut as shown in detailed section. The windows are of the pintled type, two in the rear end and a bank of four on each side, while the main door itself has window lights. Therefore, ample light and ventilation are assured, making conditions pleasant for anyone desiring to do work on the car while it is in the garage.

Exterior Finish.

A small door has been shown, thus making unnecessary the opening of the larger doors every time one wishes to enter or leave the building, and during the winter months this will keep the cold from unnecessarily entering.

The exterior finish or trim is of cypress or white pine, either making fine material if properly dried and painted. White pine is used for the windows. For the general nature of construction see details in the design.

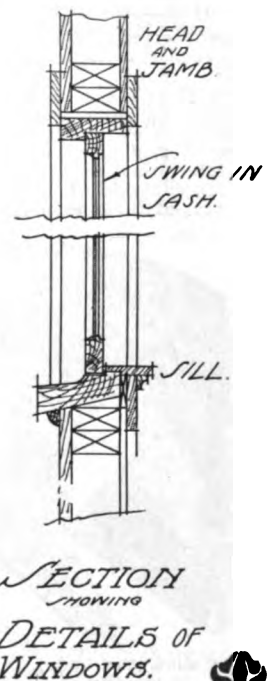
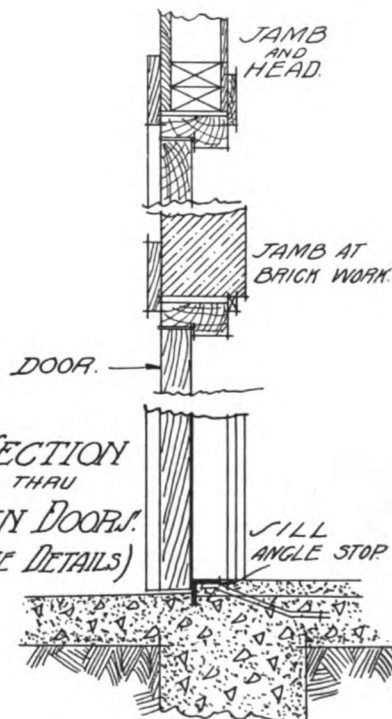
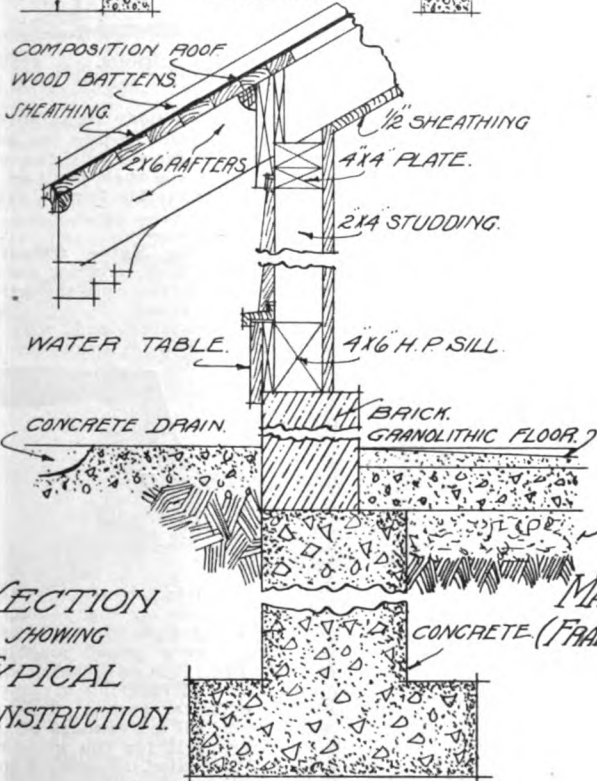
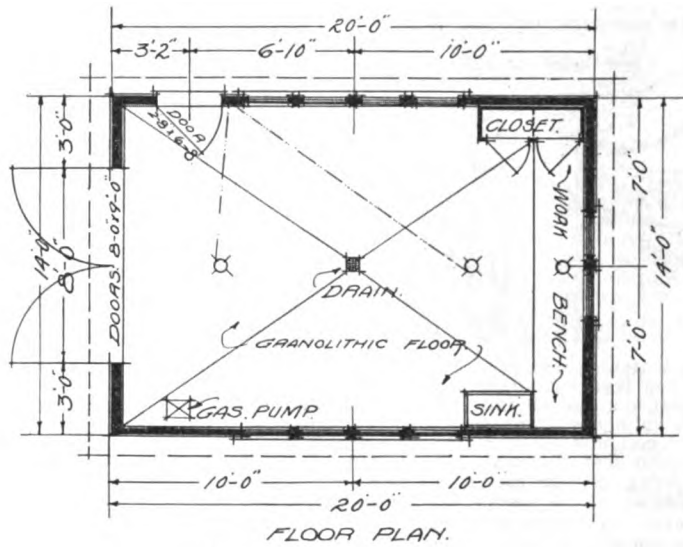
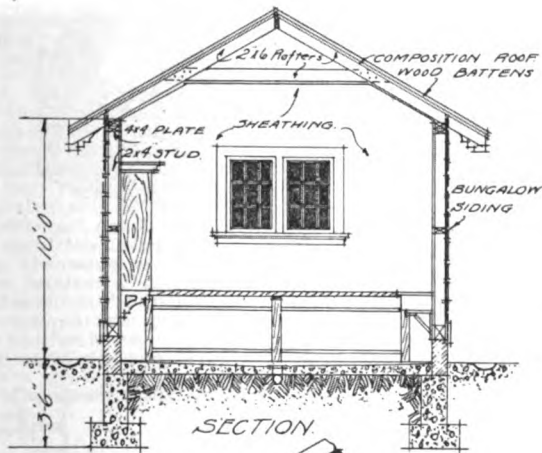
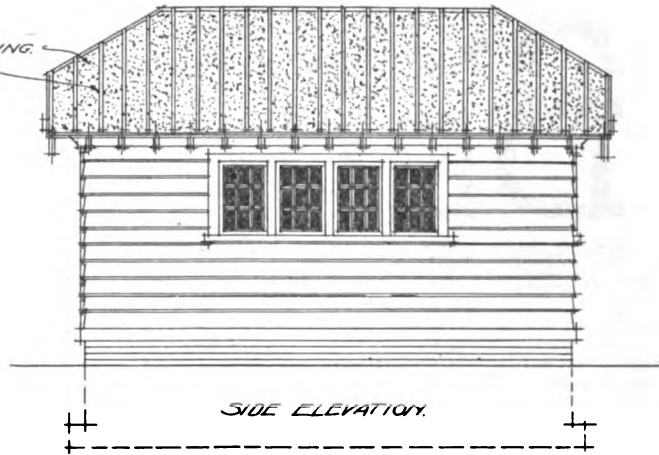
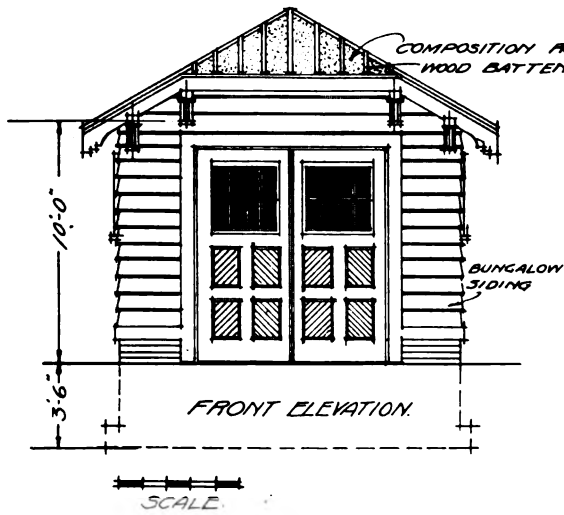
A concrete floor is laid at grade and this should be five inches of rough concrete and one inch of finish. The rough mixture should be the same as the foundation and, to save time and money, it should be put in with the foundation. As for the finished floor, a granolithic coating should be applied, a one-one mixture being the treatment suggested.

Provision should be made for a drain, the floor being sloped toward the center to insure dryness and permit the washing of a car at all times.

Equipment of Garage.

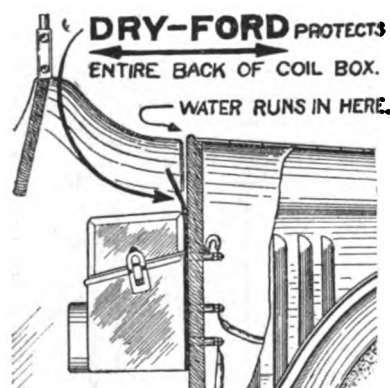
The equipment includes a work bench running the entire length of the back wall, this being two feet six inches wide and two feet 10 inches high. A sink for general purposes has been shown, this being very handy if one wishes to work around the car.

At the left end of the bench is situated a closet for odds and ends, and a storage for general tools that one might have in a garage. Electric lights have been shown, but these may be placed where the owner desires. The switches are located near the small door for convenience, with two lights over where the car will stand and one over the bench, such installation having been found satisfactory for a garage of this type.



ACCESSORIES DEPARTMENT

The **Dry-Ford** is a coil protector for Ford cars to prevent the water during rain from running down into the coil box and damaging the ignition. The protector is made of rubber and is placed between the back of the coil box and the dash, the porcelain terminals extending through



the rubber, which fits very tight around them. The top lays out slightly over the top of the coil box and all the water runs between the rubber and the dash so that the coils and coil box are kept dry. This device has been tested under severe conditions and has proved its merits the manufacturer claims. It is easily attached.

Manufactured by **Peter Gray & Sons, Inc., Boston, Mass.** Price, 75 cents.

Ever Last Retread. One of the biggest items of expense in maintaining a car is that of tire repairs. Very often this expense is equal to the cost of fuel and car depreciation. The main reason why most car owners have such large tire expenses is because they discard the tires before they are fully worn out.

Large percentages of tires are never really destroyed through use. The costly



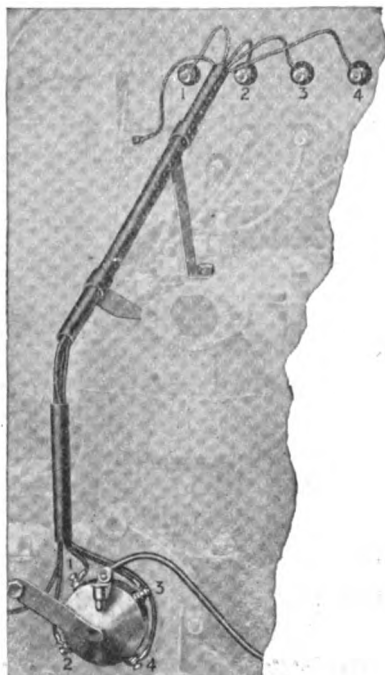
part of the shoe, the body, or carcass as it is termed, is usually in condition when the tire is thrown into the junk heap. It stands to reason, therefore, that a new tread can be put upon the old carcass and the resulting tire will last and give prac-

tically as good service as when new.

The **Ever Last Tread Co., Inc.**, 126-128 E. New York St., Indianapolis, Ind., makes a specialty of furnishing treads for worn out shoes. These treads are fully cured and need but be applied to the old carcass. The treads are built in exactly the same manner as the original treads on the tires, that is, they have side walls, a breaker strip and surface tread. The garage man can apply these treads, make a sizable profit and do the work at about one-half the price of a new tire. This means that the automobilist can obtain practically a new tire at half price. Garage men should write to obtain the company's proposition.

Manufactured by the **Ever Last Tread Co., Inc.**, 126-128 E. New York St., Indianapolis, Ind. Write for prices and other information.

The **Midway Overhead Wiring Assembly for Ford Cars** consists of a wire grouping arrangement for the placing of the necessary ignition and lighting wiring of the Ford in a position where it will be high and dry and not affected by either oil or water. The wiring is enclosed in a suitable insulated tubing, supported at two points on the engine head and by a tub-

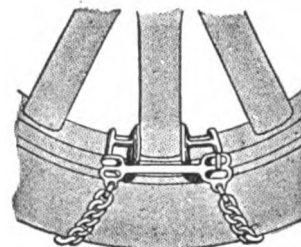


ing that fits the wiring loosely where it passes down the front of the engine to the timer. This construction makes the wiring easily accessible and as each wire is a different color it is easily traced from the coil and switch to the timer and lights.

Manufactured by the **Midway Mechanical Co., St. Paul, Minn.** Price, \$1.50.

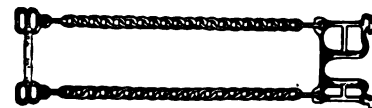
(When Writing to Advertisers, Please Mention the Automobile Journal.)

Bear Quick Detachable Non-Skids for the motorist or truck owner comprise a simple chain device for preventing the rear wheels from slipping either in mud or on icy pavements. It consists of a suitable fastening device that passes around the spokes of the wheel, having two chains attached that pass over the tread of the tire. The chain castings are made



of malleable iron and if too loose to fit around the spoke may be placed in a vise and bent in till a fit is obtained. The chain is of a quality to withstand wear and is allowed to fit the tire loosely.

The chains may be placed on the tire with the wheel in any position, and are guaranteed by the manufacturer to give

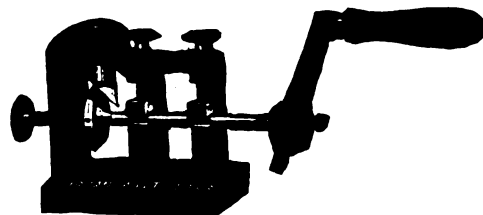


traction under all conditions. A set of eight is considered a full set, or four for each wheel.

Manufactured by the **Bear Manufacturing Co., Rock Island, Ill.** Prices for passenger cars, complete for set of eight sections, from \$8 for three-inch casings to \$15 for 5½-inch casings; for trucks, from \$12.50 to \$18.

American Adjustable Valve Grinding Tools consist of two tools, one for refacing the seat of the valve and the other for truing the valve face.

Each tool is adjustable and will fit valves from one to three inches inclu-



sive. The valve facer is a bench tool that occupies a small space on the bench, is operated by hand and does its work with a precision of a higher priced machine, smoothing off the face, preparing the valve for grinding and insuring a perfect fitting valve, the maker states. The re-seating tool cuts off all unevenness of the valve seat, preparing it for the grinding and reception of the valve, insuring a gas tight fit after grinding.

Manufactured by the **American Valve Tool Manufacturing Co., 354 West 50th street, New York.** Prices on application.

The Hamilton Multimeter is a new recording device for passenger cars and enables the motorist to know the mileage of each tire. It records gasoline mileage for the season or trip and tells if the engine is running at full efficiency. It gives warning for carburetor adjustments or for cleaning the engine by checking on the fuel used, registers the amount of oil consumed on each trip or for the season and also shows whether the engine is using too much oil.

The manufacturer for years has been manufacturing watches and other instruments requiring accuracy, and this instrument is in the same class as the firm's other products.

The instrument is placed in the dash of the car and operates similar to a

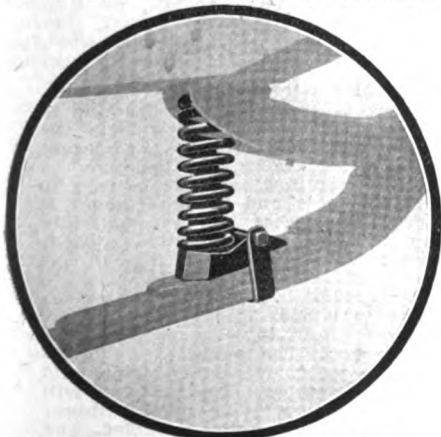


speedometer by a flexible shaft to gearing on the front wheel hub. The dial, besides showing the speed of the car on a rolling dial, also shows across the center of the main dial the mileage of any tire from one to six. To get the reading of any tire, turn the knurled nut at the right of the dial which operates the large ring surrounding the dial until the record of the tire desired comes opposite the knurled nut and the reading of that tire mileage will be shown.

The device covers the four tires used on the car and also two extras carried at the rear of the car on the tire carrier. Gasoline and oil mileage is obtained in the same manner. Adjustment instruction is given for the carburetor when the car has been driven 500 and 1000 miles, speed is shown from one to 75 miles an hour, with trip mileage to 1000 miles and season mileage to 100,000 miles.

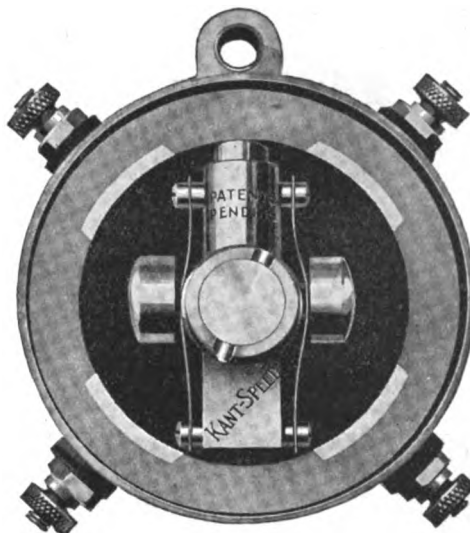
Manufactured by the Hamilton Corporation, Lancaster, Pa. Price f. o. b. Lancaster, \$40.

The Double Duty Spring Support for the Ford Truck or Sedan gives to the light Ford truck double carrying capacity, the manufacturer claims. It is attached to the rear spring of the Ford light truck or sedan (not the ton truck) midway of the spring, between the end and center, with the top of the coil bearing against the cross member of the frame. The support consists of two heavy coil springs, one placed at each side of the center as shown in the cut. The installation is not difficult.



A 10 days' trial is allowed. Any part that is found defective within one year from date of purchase will be replaced by the factory free of charge when transportation has been prepaid both ways.

Manufactured by the Dottl Manufacturing Co., Madison, Wis. Price, \$8 per set.

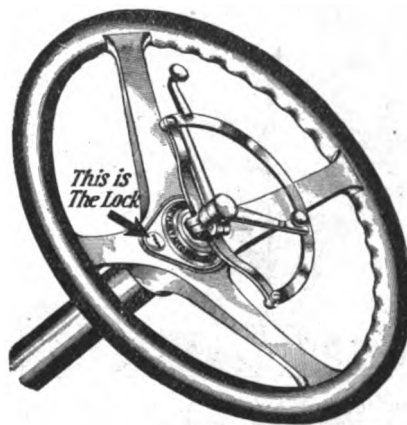


The Kant-Speed Governor for Ford Trucks, Passenger Cars and Taxicabs, consists of a timer cam that replaces the regular Ford cam in the timer case. When the speed of the Ford engine reaches 1400 to 1600 revolutions per minute, at which speed the engine reaches its rated horsepower (20 to 22½), the weights attached to the cam swing out as in a ball governor and cut out the ignition. Below that number of revolutions the balls swing in, the timer brush makes contact and the firing in the cylinders is resumed. It is easily attached.

The manufacturer claims that it cannot be tampered with, that it will prevent racing of the engine and will not impair the running qualities of the car. It is not connected with the flow of gas in any way and operates on the ignition alone.

Manufactured by the Autovar Corporation, Detroit, Mich. Price, \$10.

Perry Locks for Fords are attached below the steering wheel and when locked with the Yale key and lock the wheel turns freely and it is impossible to steer the car. It consists of a hub having the top shaped similar to a hexagon nut. A second section fits over the hub and in use acts similar to a socket wrench fitting



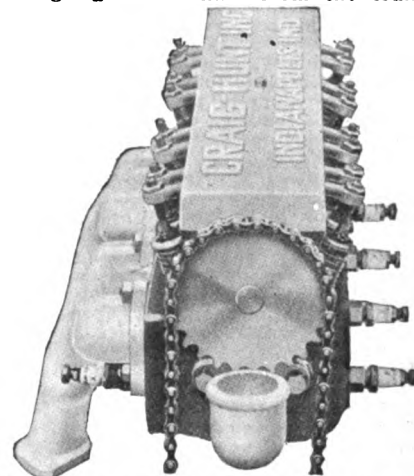
the hexagon nut. A nut having a perfectly smooth edge fits over the end of the steering rod and is covered with a lock washer which protects the nut and prevents it from being removed by a pipe wrench. The unit is fitted on top of the top of the steering housing in which are the planetary gears used in steering, and forms a suitable cover for the gears. Other sizes are manufactured for any car and include, beside the lock, the steering wheel and arms.

Manufactured by the Perry Auto-Lock Co., 2635 S. Michigan Ave., Chicago. Price for the Ford, \$6 complete; claw type, No. 4, complete, \$15; De Luxe type, No. 5, \$20.

(When Writing to Advertisers, Please Mention the Automobile Journal.)

The Craig-Hunt 16-Valve Peugeot Type Racing Head for Fords was designed for use on racing speedsters and sport cars where speed and power is the chief requirement. It embodies all the well known features of the Peugeot and the 16-valve Stutz-Wisconsin racing engines, and is applicable to the Ford.

It consists of a detachable head to take the place of the regular Ford head, having 16 valves operated by a camshaft running the length of the head and driven by a sprocket at the front end. The drive is through a roller chain from the crank-



shaft, no fan being used. This construction allows four valves to each cylinder, two inlets and two exhausts. The valves are 1½ inches in diameter and are operated by rocker arms of the forked type. Each rocker arm is operated by the overhead camshaft, which runs on three ball bearings, all of which are enclosed in an oil contained aluminum housing. The cams are of the roller follower type, each of which dips in oil and lubricates the roller end of the rocker arm.

The special intake manifold furnished with the head is flanged for either 1½ inch or 1¼ inch carburetor. The head is amply water jacketed, each valve seat being entirely surrounded by water to prevent warping.

Manufactured by Craig-Hunt, Inc., Indianapolis, Ind. Price \$150 f. o. b. Indianapolis.

The Geneco Distilled Water Bottle and Storage Battery Filler consists of a two-quart water bottle containing distilled water, a hydrometer syringe for supplying the water to the cells of the battery and testing the electrolyte, and an indicator on the cover conveniently marked with the days of the month. There is an indicator at the side of the cover so that the operator may know when the battery was attended to last. By this method distilled water is supplied to the battery at regular periods without danger of outside



contamination. The outfit is patented under the Harvey patent.

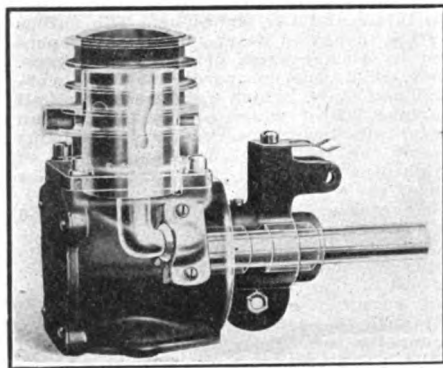
Manufactured by the General Scientific Equipment Co., Inc., North Philadelphia, Pa. Price, \$1.75; west of the Mississippi, \$2.

The Rex Valveless Pressure Pump is of the piston valve type, thus doing away with many small parts and the complication of spring check valves. The Rex pump is said to combine the efficiency and wearing qualities of the three port to stroke and Knight piston valve types as adapted to gasoline engines. As the operation of the piston valve is entirely mechanical the back pressure has no effect and the only resistance the pump has to overcome is the actual pressure of the tire, the manufacturer claims.

Four parts compose the Rex pump—the cylinder and base casting, piston, connecting rod and shaft. Each part is of sufficient size to be practically wear proof and unbreakable. The pump is lubricated by means of graphite lubricant carried in the base. Air vents in the base equalize the pressure of the base and prevent forcing the lubricant out of the pump or past the piston into the tire. The air delivered is clean and a little above atmospheric pressure.

The combination of the ball and socket joint and its eccentric position at the end of the crankshaft when in operation will give the piston an oscillating and reciprocating motion. The oscillating motion of the piston will mechanically open and close the intake and outlet ports at the proper time.

When the piston is at the top of its stroke air is permitted to enter through the preliminary intake openings into the chamber, where it is compressed to about 10 pounds pressure upon the down stroke of the piston. At this time a vacuum is created in the cylinder, into which air is

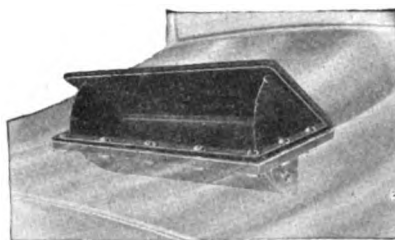


admitted upon the contact of the intake groove with the intake part. As the piston travels downward the intake port is shut off by the curve of the groove. This groove is then connected with the groove leading into the lower chamber and which admits the compressed air from this chamber into the cylinder as the preliminary compression. On the up stroke of the piston the air in the cylinder is then compressed until the outlet groove comes into connection with the outlet port. At this point the compressed air from the cylinder is forced through the opening in the piston which is connected with the outlet groove and then passes on out through the outlet port to the tire.

The Rex pressure pump is adapted to installation on many makes of cars between the water pump and generator on the pump shaft. Special gears and fitting are required for different cars and in ordering mention should be made of the year, model, number and make of the car.

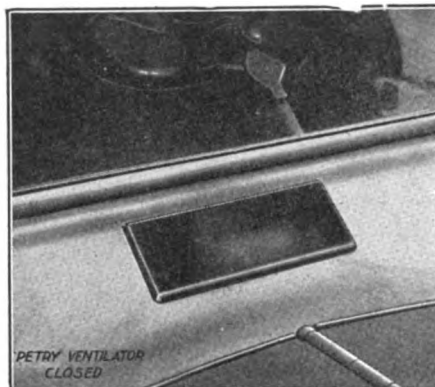
Manufactured by the Rex Machine Co., 3201 Shields Ave., Chicago. Prices and literature on application.

The Petry Ventilator for Ford Cars and the Universal Ventilator for All Other Cars consists of a door like arrangement placed in the cowl and, in the Ford type, operated by the hand and held open by means of notches at the sides. In the Universal type the door or shutter is controlled by a push and pull rod from the dash, while the Ford type is operated from the drivers' seat. The ventilators are made entirely of sheet steel stamped to



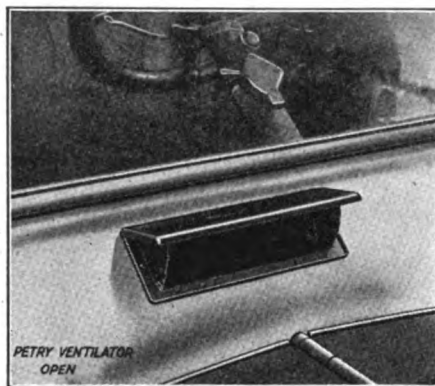
the desired shape and finished in enamel.

The dash regulator of the Universal type passes through a nickel plated brass escutcheon plate, the rod being held in any desired position by means of a nickel plated brass thumb screw. By this means the ventilator may be opened or closed to any extent by merely reaching toward the



instrument board. Specially designed baffle plates are provided so that air may be directed to any point. This ventilator is a decided improvement for closed cars, as it allows the entrance of cool air to the driving compartment.

The Petry Universal Ventilator is applicable to the cowl of any type car. The manufacturer has made a study of the various designs followed by car manufacturers and has adapted the ventilator attachment to them. A heavy, stamped steel sub-base is supplied with the universal type, making the installation easy. Highly finished in enamel to match the finish of the car to which it is attached.



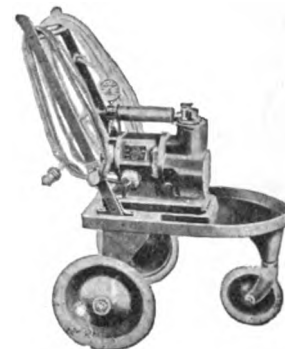
Manufactured by the N. A. Petry Co., Inc., 1307 Race Street, Philadelphia. Price for Ford cars, \$3; Universal ventilator, \$5; fully guaranteed.

Black & Decker Portable Electroflator consists of an electroflator placed on a three-wheeled truck, the smaller front wheel being castored so that the outfit may be turned in a small space. This outfit is convenient and of a size that is easily moved from place to place in the garage for inflating tires of passenger cars and trucks.

A suitable handle carries the necessary length of hose and the connector for inflating tires, besides acting as a suitable arrangement for pushing the electroflator

about the garage. The electroflator is equipped with a gauge, shut off valve and the proper length of lamp cord for connecting the motor of the electroflator to any convenient lamp socket.

Provision is made for starting the motor by a snap switch, located at the side of the motor. Pressure is controlled by a small cylinder mounted on the top of the electroflator pump. The wheels are rub-



ber tired, insuring quiet running while being pushed over the floor. The electroflator is mounted on a substantial iron base, having a raised edge, so that oil leakage from the motor and pump is kept on the base and easily cleaned with waste.

Manufactured by the Black & Decker Manufacturing Co., Baltimore, Md. Prices on application.

The Cambridge Rectifier provides an automatic means of charging storage batteries in the car or outside for the motorist who wishes to keep his battery fully charged at all times. The cost of operation is small and the charging may take place during the night while the car is in the garage.

The Cambridge Rectifier is manufactured to work successfully on the ordinary city alternating current of 60 cycles. It operates through its transformer to change this alternating current into direct current after reducing it to the proper voltage for storage battery charging. The current on entering the rectifier through the cord and plug is passed through a transformer to lower its voltage to slightly more than the battery voltage. The current is then conducted through a vibrating reed which oscillates to and fro in unison with changes in direction of the alternating current. On the end of this reed is a contact point which makes contact with another similar point connected



to the storage battery whenever the current is flowing in the correct direction to charge the battery, and disconnects the battery from the circuit when the current is flowing in the wrong direction.

Impulses thus flow into the battery in one direction only and the instrument is so constructed that it automatically charges in the correct direction regardless of which direction the battery is connected.

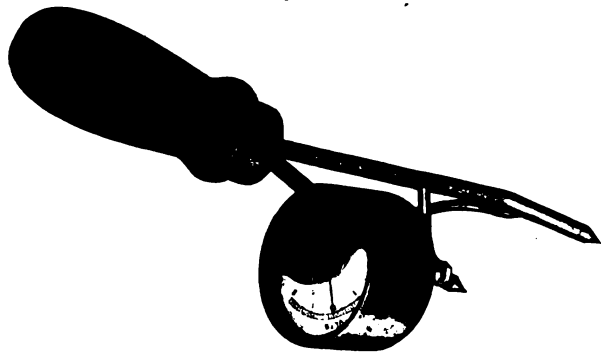
The instrument is complete in itself, as there are no lamps, liquids, rheostats or other parts likely to become broken or require renewal. The manufacturer guarantees it to be free from electrical and mechanical troubles and that it will charge any battery of specified voltages at approximately the rate specified, and will repair or replace without charge any defective instrument returned to the factory within one year from date of purchase.

Manufactured by the Clapp-Eastham Co., Cambridge, Mass. Price, \$22 f. o. b. Cambridge.

(When Writing to Advertisers, Please Mention the Automobile Journal.)

The Springfield High-Rate Discharge Instrument consists of a special, high-grade voltmeter with a center reading 2-0-2, graduated in 10ths. The voltmeter is mounted on two steel posts which terminate in a convenient handle. Between these posts the current is short circuited through a fixed resistance which determines the rate of discharge.

The resistance has a current capacity of 80 amperes cold and 70 amperes hot. When

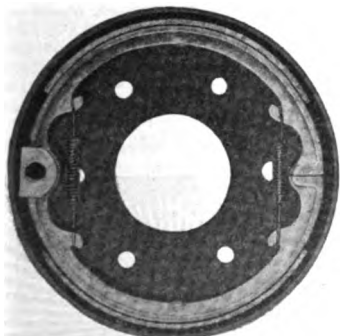


a cell is in good condition the voltmeter needle will hold its position somewhere between 1.3 and 1.7. It will not register higher because the high-rate discharge produces an immediate drop in the voltage. If the cell has defective insulation the needle will gradually recede toward the center as the high-rate discharge of the cell takes place. If the cell has an open circuit, or broken connectors inside or outside the jar, the needle will remain at zero. From 10 to 20 seconds should be the limit of the test.

Contact with the terminals of the battery should be made by steady pressure and with a wiping effect instead of prodding. To secure good contact points should be kept clean and occasionally sharpened with a file. In testing batteries a comparative reading of the cells is important. A perfect condition is indicated by all cells registering the same voltage and any variation indicates a weakened condition. This instrument is especially adapted for comparative readings, the manufacturer claims.

Manufactured by the John O. Helms Co., Springfield, O. Prices on application.

Clamert Malleable Iron Brakes for Ford Cars consist of two malleable iron castings joined by a patented hinged joint of sheet steel, the face of the castings having a lining of asbestos, brass wired. The castings are held together by the patented hinged joint that tends to hold the castings in line, preventing them from rubbing on the side of the case. Two springs, fastened by suitable hooks at each end, allow for the contraction of the castings after the brake has been in use.



Separation of the castings is caused by an elliptical roller between the opposite ends of the castings, operated by the pull of the brake rod and the brake arm. The manufacturer claims that many brake troubles so common to Fords are eliminated by the use of this brake.

Manufactured by the Clamert Manufacturing Co., Pittsburgh, Pa. Price, \$3.50 per set; in Canada, \$4.

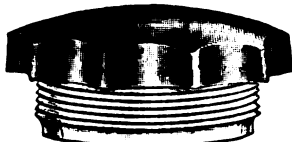
The Morgan Red Tire Pump has a special valve of light weight which controls the flow of air from the pump to the tire, yet for all of its lightness, is capable of withstanding severe service. A large, heavy spring on the rod prevents the plunger from striking against the top when the plunger is at the upward limit of its stroke. It is claimed that the Morgan pump may be worked at top notch efficiency, that the air will be delivered without heating and that the pump's efficiency will not be impaired.

The barrel is made of high quality, heavy, cold drawn steel, and is machined down to .001 of an inch inside and out. The top and bottom are not threaded, but are held in place by long bolts passing from the bottom cap up and through the top cap and fastened by nuts. This construction, it is claimed, gives an unusually strong pump that will withstand hard and rough usage.

The connecting hose is of highest quality five-ply Goodrich stock, and is impervious to oil, water and dirt. An adjustable foot strap is provided, allowing the pump to be used either vertically or otherwise. The handle is of seasoned ash with shellac, and is easily removed from the piston rod by unscrewing. The finish is of fire engine red enamel, baked on, preventing the formation of rust.

Manufactured by the Morgan Manufacturing Co., Inc., Keene, N. H. Prices, 22-inch barrel, \$4 each; 17-inch barrel, \$3.50 each.

Composition Covered Radiator Caps for Ford Cars consist of a regular metal cap covered with a composition closely resembling hard rubber and have advantages over the plain metal cap. The chief advantage, the maker states, is that the composition does not become heated as does the all-metal cap, allowing the cap



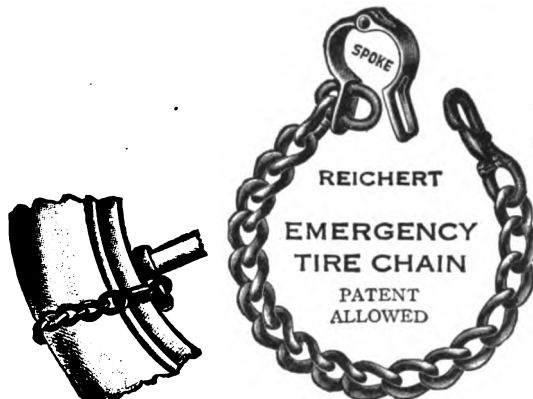
to be removed without burning the hands. The cap is made from the best of material throughout, is accurately threaded to fit the Ford filler tube and is furnished with a copper plated steel shell.

(When Writing to Advertisers, Please Mention the Automobile Journal.)

Other articles for the Ford manufactured by this company include spring shackles, valve stem adjusters, hub caps, breather pipe oil fillers and a full line of compression and oil cups for all parts of the Ford car.

Manufactured by the Bowen Products Corporation, Auburn Division, Auburn, N. Y. Prices on application.

Reichert Emergency Tire Chain No. 220 consists of a single chain attached to a patented clasp that slips around the spoke of the wheel, the other end of the chain terminating in a spring hasp having a separable end fastening to the end of the chain link. The chain is adjustable and may be shortened at the will of the driver



by means of the separable end fastening of the spring hasp.

Four chains constitute a set and it is claimed by the manufacturer that the set is capable of pulling a car or truck out of mud, sand or snow with ease. The chains are applied without the use of a jack and are packed four in a cloth bag, ready for instant use.

Reichert Ford Truck Chain No. 221 is similar to the passenger car chain, differing only in size and the fact that it is made to fit over 1 1/2 inch oval spokes. Packed six units in a bag.

Manufactured by the Imperial Bit and Snap Co., Racine, Wis. Price for Ford passenger cars, \$3.20; for 3 1/2 and 3-inch tires, \$3.50; for 4 and 4 1/2-inch tires, \$4; for 5 and 5 1/2-inch tires, \$5; for Ford truck, \$12.

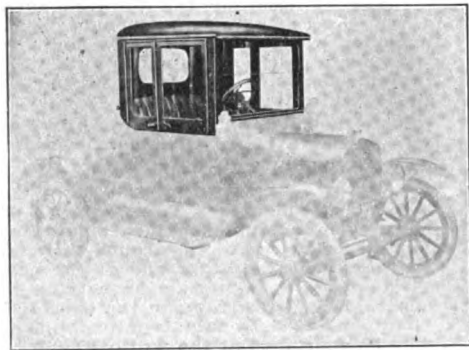
Apco Metal Oil Gauge for Ford Cars consists of a metal chamber containing a float to which is attached a rod with a white ball on the end. The distance between the ball and the top of the gauge indicates the height of the oil in the case. This height may be determined at night as readily as in the day time and dirt or



dust will not interfere with its operation. The gauge is attached to the lower level oil petcock and acts in the capacity of a sight oiler, instead of the regular sight oiler.

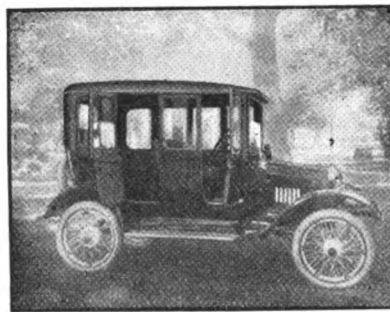
The installation is simple. Remove the lower petcock, thread the gauge into its place and screw the petcock into the gauge. Each gauge with instructions for attaching is packed in a separate box.

Manufactured by the Apco Manufacturing Co., Providence, R. I. Price, \$1 each; \$7.50 the dozen.



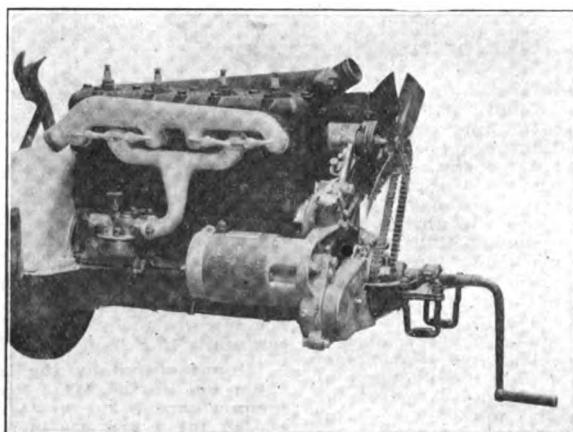
Miller All-Season Top for Ford Cars. The maker states that this is an unusually well made convertible top for the Ford owner, the top being made from the best of material throughout, and having heavy glass panels at the side and rear. The covering is of "Neverleak" material, with metal troughs along the sides to allow the water to be carried away. The inside is lined with a mohair material having a spotted effect. The sides are removable, allowing the car to be used during the warm months with comfort.

The glass in the rear doors is in two



sections so that the upper section may be lowered for ventilation. Curtains may be purchased for summer driving if desired, as they are not included with the top, many owners preferring to refit their old curtains. A patented device facilitates the opening of the doors and the glass above from either the inside or outside. The top is made for either the roadster or touring car.

Manufactured by the Miller Auto and Body Manufacturing Co., Caro, Mich. Prices, Ford roadster, \$80; touring car, \$107.50 f. o. b. Caro.



A. B. C. Starter for Ford Cars. The A. B. C. system of starting and lighting for Ford cars consists of a motor mounted on the upper section of the Ford engine base and connected to the crankshaft by reduction gears, a silent drive chain and sprockets. The sprocket on the crankshaft has an automatic release, allowing the motor to stop after the engine has been started. The generator is securely fastened to the opposite side of the engine cylinder block and connected to the crankshaft by a silent chain. The sprocket on the crankshaft that drives the generator is keyed to the shaft. The hand starting crank is left in its usual position and is ready for instant use.

The chain from the motor to the crankshaft is enclosed partially by a housing to keep the dust from entering the gear

case of the motor. A dash set is included with the unit, having an ammeter, dash light and switch for the control of the lights. The ignition is obtained from the magneto of the Ford in the usual manner. A storage battery is included and may be placed in a box on the running board. The fan is driven by a grooved pulley on the generator shaft and is adjusted in the usual manner.

The clutch of the motor has been redesigned. The manufacturer claims that it is quiet and smooth in operation, requires no attention and is entirely free from the engine after engine starts. The starter turns the engine rapidly, insuring starting in cold weather.

Manufactured by the A. B. C. Starter Co., Detroit, Mich. Price \$115 f. o. b. Detroit.

The Gardner Thermostat Carburetor is of the puddle type for the Ford car. It is made to handle the later heavier fuel and makes use of a thermostat control that allows a heavy flow of fuel at the start, and when the engine warms the fuel is automatically cut down. One setting of the needle valve is all that is necessary, and the manufacturer claims that this adjustment will not change or need change-

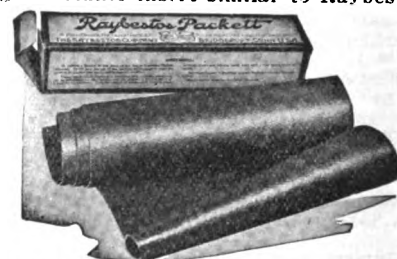


ing, as the carburetor is entirely automatic and will adjust itself to climatic changes due to the thermostatic control.

A point that the manufacturer emphasizes is that the carburetor is so constructed that the gasoline before entering the combustion chamber is thoroughly vaporized and enters as a fine mist, causing complete combustion.

Manufactured by the Gardner Carburetor and Brass Works, Detroit. Prices on application.

Raybestos Packett consists of a roll of asbestos packing, weighing 1½ pounds, 40 inches long and 10 inches wide. It is a woven sheet of very close weave to insure strength and the material is made of the finest grade of asbestos yarn, having a metallic insert similar to Raybestos

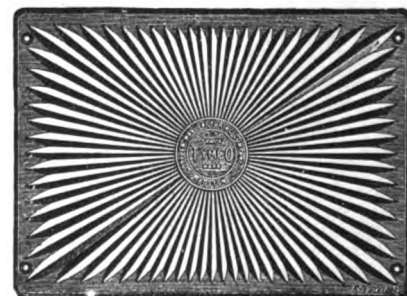


brake lining. The packing is graphited on one side so that it may be easily removed and many times used again.

Raybestos Packett is intended for use on gasoline or steam engines where packing is subject to great heat and high pressure, and is especially adapted for use on cylinder and manifold gaskets on gasoline engines, the manufacturer claims.

Manufactured by the Raybestos Co., Bridgeport, Conn. Price, \$2.50.

The Tyler Safety Step Plate for the running board of the passenger car is made of heavy canvas backing faced with rubber on each side, the top or wearing surface ribbed to take the wear. Type C is in one color, while type D is manufactured with a colored center or medallion having the



manufacturer's name and trade mark plainly stamped upon it.

Manufactured by the Tyler Manufacturing Co., 64 Pearl Street, Boston, Mass. Price, type C, \$1.50; type D, \$1.75.

The Kramer Valve Spring Releaser and Retainer not only releases the spring but also retains the valve spring, leaving both hands free. It holds the spring until ready to replace, or the spring may be removed and afterwards replaced in the tool



and compressed ready for inserting. The releaser and retainer consists of two jaws hinged at the upper end and joined by a hinged bar in the rear of the jaws, the upper end of this hinge being fastened to a center rod forming a bolt at the top. The jaws are operated by a winged nut fitting the threaded bolt. Turning the nut to the right forces the jaws together, compressing the valve spring, while turning the nut to the left releases the spring. The jaws are adjustable sideways to fit around the different sizes of valve stems from 9/16 to 1¼ inches. With each tool is included a complete set of instructions for the grinding of valves.

Manufactured by the U. S. Compass Co., Cedarburg, Wis. Prices on application.

(When Writing to Advertisers, Please Mention the Automobile Journal.)



Ammeters, Voltmeters and Volt-Ammeters. The "Handy" pocket, portable, direct current ammeters, voltmeters and volt-ammeters are a newly designed line for the use of the garage and service station repairer and the motorist. The "Handy" is small, compact and light. The line comprises milli-ammeters and ammeters up to 50 amperes; milli-voltmeters and voltmeters up to 150 volts and volt-ammeters up to 50 amperes and 150 volts, all self-contained. The ranges are increased beyond that by the use of appropriate shunts and multipliers.

Mechanism is of the permanent magnet, moving coil type, insuring uniform scale divisions and dead beat indications. Magnets are two in number, well aged and of high grade tungsten steel. The moving coil is light and very rigid. Jewels are carefully selected Ceylon sapphires. Pivots are hardened steel, accurately ground and pointed. The staff is solid, preventing friction troubles. Springs are accurately ground and well aged. The entire mechanism is mounted on one base.

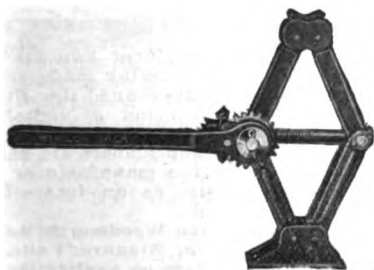
The dial is pure white bristol board with easily readable figures, and is so attached to the dial pan as to prevent buckling. The pointer is light, but rigid aluminum and is of the knife edge type, enabling close readings. All instruments are individually calibrated and guaranteed accurate within one per cent. of full scale value. The scale is $2\frac{3}{4}$ inches long.

The case is drawn brass and has a black rubberoid finish. The base is of selected, close grained wood, which will not warp and being a non-conductor the instrument may be laid on top of the battery without short-circuiting it. Terminals are of the non-removable top type.

Manufactured by the Roller-Smith Co., 233 Broadway, New York. Prices on application.

The Hi-lo Jack employs a somewhat different principle from that usually followed in jack construction. It is unique in design and has many advantages not usually found in the ordinary jack.

The construction is based on the toggle principle. As a result of tests made by the manufacturer and by users it is claimed that the jack is able to operate in places where it would be impossible to use the ordinary jack. For instance, when a truck or passenger car becomes mired in the mud the jack may be placed



(When Writing

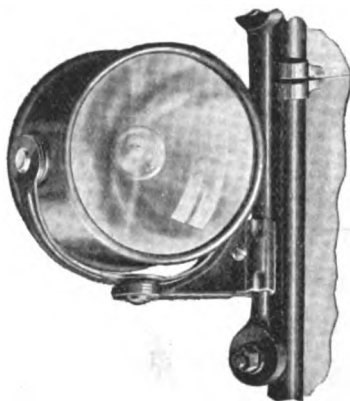
under the axle of the truck and the vehicle raised out of the mud.

When folded the Jack occupies little space in the tool box, being only five inches long when in this position. It will start to lift at six inches and has a range from six to 17 inches, and the higher it is extended the greater the lifting power.

Hi-lo jacks are made in six different sizes for passenger cars and the heaviest trucks. They are constructed from a combination of drop forgings, high grade malleable castings and cold rolled steel, so made that they have a large margin of safety over rated capacity.

Manufactured by the Rowe Calk and Chain Co., Plantville, Conn. Prices and literature on application.

The Stewart-V-Ray Searchlight is made throughout of the best material and is nicely finished in black enamel baked on. It is suspended from the side of the windshield by suitable brackets of the clamp type and may be turned either to the side, inverted or turned to the ground. At the rear of the lamp is a mirror that enables the motorist to see traffic at the rear.



The reflector is deep and is fitted with a high power lamp that enables the driver to see the road without difficulty. The lamp is supported by trunnions at the side and a swivel joint at the top, allowing a wide range in which the light may be turned.

Manufactured by the Stewart-Warner Speedometer Corporation, Chicago, Ill. Price, \$6.

American Hammered Piston Rings are made by a process different from that usually employed in the manufacture of oil proof piston rings. Each ring is cast separately so as to insure proper cooling. The rings are turned in a lathe and the interior of each is then treated to a hammering process, the heavier blows being struck in the center of the ring and the lighter at the sides. This method of

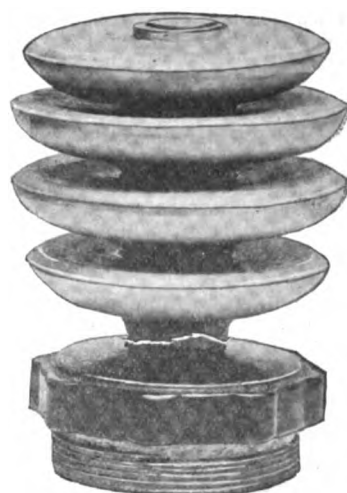


enlargement makes it possible for the ring to fit the wall of the cylinder perfectly and as the ring is the same thickness all around it fits the grooves of the piston evenly.

The maker states that carbon formations in the piston grooves are prevented and that oil from the base will not work up by the rings and cannot form on the head of the piston and in the combustion chamber. The rings have a tendency to increase the compression of the engine cylinders and increase the power of the engine. They are especially adapted to Ford engines.

Manufactured by the American Hammered Piston Ring Co., Newark, N. J. Prices and literature on application.

(When Writing to Advertisers, Please Mention the Automobile Journal.)



The Cone-Denser is fastened to the radiator cap of the automobile and serves the double purpose of giving an alarm when overheating of the engine occurs, either through lack of lubrication or water, by giving a whistling sound, caused by the steam pressure in the radiator, that is easily heard by the driver. It also condenses the cooling medium when alcohol is used with the water during the winter months, returning it to the radiator to be used over again. By this method, the manufacturer claims, the waste of alcohol is eliminated and the cooling medium is kept at its proper strength at all times.

The device consists of a series of baffle plates having a large amount of cooling surface. As the steam or vapor rises it collects in the cone-denser, is cooled and the liquid returned to the radiator in a liquid state. It also prevents evaporation of the non-freeze alcohol solution.

Manufactured by the Cone-Denser Manufacturing Co., 116 Plymouth Bldg., Minneapolis, Minn. Price, \$6.

The Duplex Universal Governor for Ford Cars is simple in construction and is easily attached to any Ford engine. The governor proper is attached to the engine manifold between the carburetor and the engine. The power to operate the governor is obtained from the timing gear case in the Ford, and in other types of cars, such as use a sliding gear transmission, a double drive system is used.



Power for this system is obtained from the transmission and the end of the camshaft at the rear of the engine, each drive using a separate cable, with both cables centering at the governor. The shutter of the governor differs from the shutter ordinarily used in that a grid construction is employed.

The manufacturer claims that this construction allows the gas to enter slowly and has a tendency to break up the gas before entering the combustion chamber,

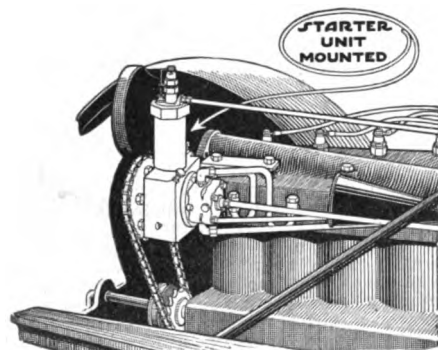


allowing the engine to operate to better advantage. The action of the shutter is positive and easy, and racing of the engine is prevented by taking the drive from the engine timing gears, it is also claimed.

Manufactured by the Duplex Engine Governor Co., Inc., 36 Flatbush Ave. Extension, Brooklyn, N. Y. Price and literature on application.

The Ten Eyck Air Starting System for the Ford consists of a storage tank supported from the frame of the car under the seat, connected to an air pump, and located at one side of the engine at the front, the pump driven by a chain from a sprocket on the crankshaft and a control valve located on the steering wheel. The operation of the pump for starting is by means of the air control on the steering wheel. Three positions are shown here, neutral, start and pressure.

Placing the lever to the right allows the air to pass from the distributor of the pump to the cylinders of the engine, the air being taken from the tank. After the engine is started the pump operates and, by turning the lever to neutral to the left position, air is forced into the pressure tank to bring up the pressure again. It is claimed that pressure enough is carried



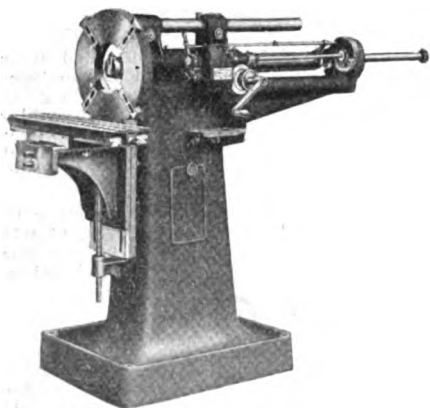
in the tank for from 12 to 20 starts. With the control lever in the neutral position the air is allowed to escape.

About one-quarter horsepower is required to operate the pump when pumping against the pressure of the tank, but when pumping into the air the power required is a negligible quantity. A primer button is provided for cold weather starting and is located on the floor of the car within easy reach of the driver.

The manufacturer claims that the use of air under high pressure will have a tendency to force out any accumulation of carbon from the cylinders before it has the chance to harden. The device is guaranteed for one year against defective material, which should be returned to the factory, express paid.

Manufactured by the Air Device Co., 2975-77 Cottage Grove Ave., Chicago. Prices on application.

The Kriesel Multi-Purpose Machine is a combination of three machines in one for the machine shop of the service station and garage. It will handle an unlimited range of boring, milling and drilling jobs accurate and economically. The frame and base are cast in one unit, assuring perfect alignment of parts.



It is possible to purchase the machine for boring and re boring work only, adding the milling and drilling features later as desired. The machine may be bought on a plan enabling the purchaser to pay for it from the profits of work done on it.

Such work as re boring, drilling, cutting gears, squaring a shaft, cutting keyways

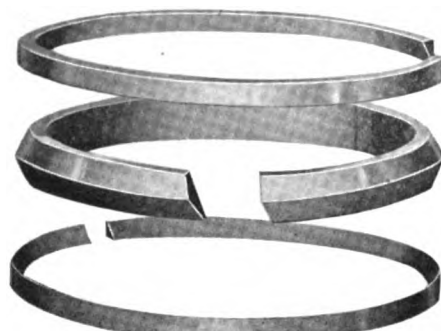


for both straight and Woodruff keys, drilling wrist pin holes and practically all classes of machine work in automotive repairing may be done on this machine.

The maker announces that the machine is built throughout from the best material obtainable and that all cutting tools are of the highest grade steel for the purpose. Four roughing tools, four finishing tools and many other attachments accompany the complete machine.

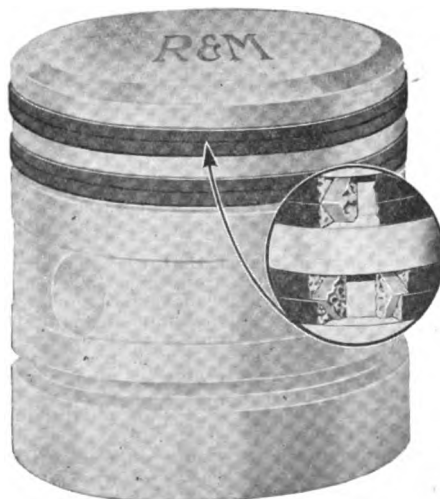
Manufactured by the Mill City Co., 800-823 Plymouth Building, Minneapolis, Minn. Prices and literature on application.

The R & M Conform Piston Rings are formed of three sections, the inner or "bull ring" and an upper and lower section. Wear does not affect the inner or bull ring and all wear is taken by the outer rings or sections. The manufacturer claims



that this type of ring is absolutely gas tight and that two rings will prove as satisfactory on a piston as three. As the spacing between the rings is at different points there is still chance of the gas leaking past.

The R & M Conform Ring is not an experiment, but has been used successfully by the inventor on all types of cars and trucks and has been proved out in the hardest fields and under conditions that the average car owner would never meet,



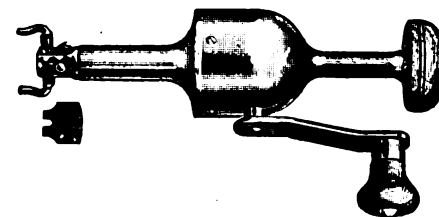
it is claimed. Long life and economy are guaranteed by the maker, who states that the points where wear may occur are easily removed.

The rings are sold direct from the factory to the service station and garage trade or through the jobbing trade. A money back guarantee goes with the sale of all R & M Conform Rings.



Manufactured by the Modern Electric and Machine Co., Indianapolis, Ind. Prices on application.

Goodell Pratt Valve Grinder No. 268 is a hand tool used by the automobile and truck repairer for grinding valves in gas engines. By means of a simple operating mechanism the spindle is caused to rotate back and forth when the crank is turned continuously in one direction. The cast iron casing, in which the working parts are enclosed for protection, gives the tool



sufficient weight so that additional pressure need not be applied to the valve seat.

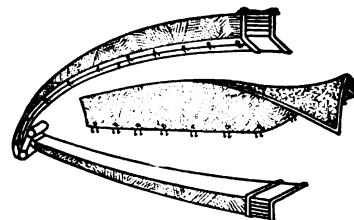
Each tool has a polished hard wood crank handle and a Lignum-Vitae head. The frame is finished in red and black enamel. Both an adjustable spanner and a blade are provided in order that the tool may be used universally. The length over all is 10 1/4 inches and the net weight 3 1/4 pounds.

Manufactured by the Goodell Pratt Co., Greenfield, Mass. Price, \$4.20.

Woodworth Lubricating Spring Cover is a new spring covering manufactured for the trade for the 1920 season. It consists of a cover of leather or imitation leather, lined with wool felt and saturated with oil. It is placed on the spring and the edges hooked in a suitable manner, making a covering that is oil, dust and water tight.

The manufacturer claims that springs oiled in this manner will not require oiling more than once in one or two years.

The covers are easily fitted to any make of car, full instructions being sent with each, and they are very convenient for dealers to handle, as there are only seven standard sizes besides the Ford sets to fit



all cars. They are made of two grades, one having an outer covering made of oil and water proof leather and the other having the outer covering of imitation leather, which is also proof against oil and water. Dealers and jobbers are asked to correspond with the manufacturer regarding these covers, as an interesting proposition is offered.

Manufactured by the Woodworth Manufacturing Corporation, Niagara Falls, N. Y. Prices and literature on application.

(When Writing to Advertisers, Please Mention the Automobile Journal.)



Whittmann Storage Batteries are manufactured for replacement purposes and may be fitted to practically all cars by simply changing the battery terminals. They are made in five shapes and will easily fit the battery boxes of the cars for which they are intended. These batteries are standard size and in all cases they comply with the recommendations of the Society of Automotive Engineers, states the manufacturer.

Taper terminals are made to be used either as right or left outlet, as can also the lead end wire terminals. This policy of standardization greatly reduces the problems of the service station and the battery repairer and reduces the cost to the motorist.

Batteries are shipped with terminals detached so that the service station man may put on any style of terminal that his customer may wish, and in this manner any size of stock battery may be used for many different types of cars.

Taper terminals are made in five sizes, to fit all the different taper plugs in use. A, B and C terminals are tapered $\frac{3}{16}$ inch to the inch, but the holes vary in size. D and E terminals are tapered $\frac{1}{4}$ inch to the inch. The maker issues to the trade a neat booklet covering the line of batteries and the parts for them.

Manufactured by the **Whittmann Batteries**, 207-9 South 11th St., Lincoln, Neb. Prices and literature on application.

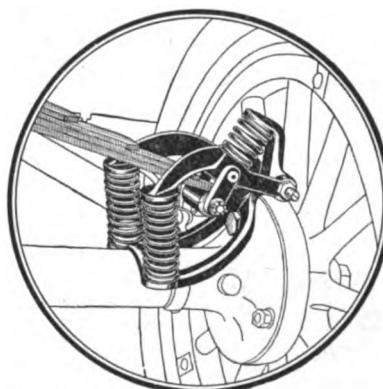
The New Hydrate Cell Tester, a device for testing storage battery cells, consists of two hex special steel prods three inches apart at the points with the upper ends assembled in a handle. A special patented nickel-chromium resistance of .01 ohm connects the prods. Suspended on props between the prods is located a voltmeter



with 2-0-2 volt scale. The patented resistance varies but imperceptibly with change in temperature and will not oxidize or rust, the manufacturer claims. The voltmeter is of the moving coil type of rugged construction.

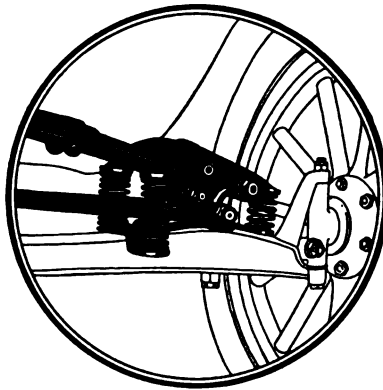
Manufactured by the **Service Station Supply Co.**, Detroit, Mich. Price, \$15.

The Float-A-Ford Absorber for Ford Cars, the maker announces, embodies a new principle in absorber construction. For installing on the front axle a special perch is supplied, accommodating the radius rods and supporting the absorber. The absorber consists of three springs, supported by suitable brackets, the lower bracket lying parallel with the axle and supporting the springs in cup-shaped holders at each side of the axle and the holders joining one another by a



bridge passing over the axle. An extension of the lower bracket passes back of the perch and supports the spring in a cup shaped base. From the top of the perch another bracket fastened to the perch passes forward, dividing into two arms, each arm forming the top support for the springs by means of suitable cup-shaped holders. This bracket also passes to the rear, forming a cup-shaped top support for the spring. A suitable shackle connects the end of the spring with the bearing point of the absorber.

The rear spring absorbers are attached in a different manner. The supporting bracket for the bottom of the springs fastens rigid to the flange of the axle housing, divides into two forks extending parallel with the axle housing and is supported on the housing by a cross band joining the two forks. The upper part of this bracket forms the support for the spring. The upper support or fork of

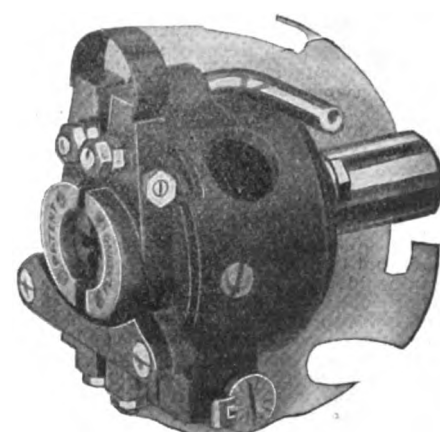


the absorber is fastened to the lower bracket at a point over the brake drum and passes forward over the spring end where it is shackled to the spring end by a short coupling or shackle, the bracket passing forward and dividing into two forks that form the upper support for the springs.

The manufacturer claims that this absorber will "float" a Ford over the rough spots in the road, that the device allows free spring action and does not disturb the chassis construction.

Manufactured by the **Burpee-Johnson Co.**, 301-313 Kentucky Ave., Indianapolis, Ind. Prices on application.

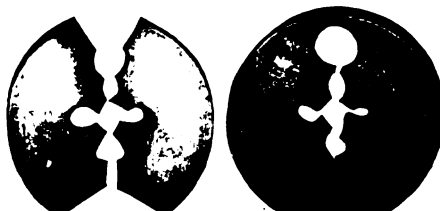
The Federal Self-Opening Die Head is a patented device for use within the turrets of hand or automatic screw machines, but may be used on a lathe. It consists of a



special head in which may be placed any of the standard button dies obtained from supply houses, and by splitting them and grinding off the rough corners they are adapted for use in the Federal Die Head. Chasers are not required for cleaning the thread after cutting, as the head may be opened and withdrawn, leaving the thread clean. The cutter or die is cleaned by slipping it from the head and immersing in gasoline.

By using the split form of die it is possible to sharpen it. The die is closed before starting the thread by pressing the button on top of the holder, or may be closed automatically by a lever device adapted to the turret of the machine on which it is used. For added ease of operation there is a self-alignment feature.

It is claimed that it will cut any thread that a button die can cut and with all the

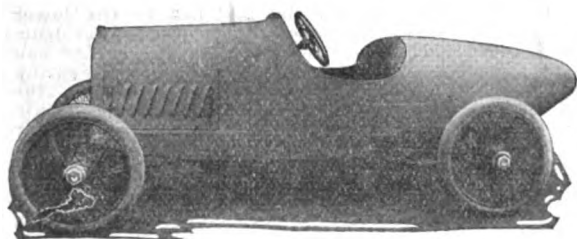


accuracy for which button dies are famous. On Nos. 3 and 5, where one cut may not give the special refinement of product desired, an attachment to permit the operator to take both a roughing and finishing cut is supplied. The die opens automatically when the travel of the turret ends or at any point in the cut by stopping the turret slide. When the forward travel of the turret is interrupted the rotation of the work draws the jaws ahead until they clear the jaw blocks and open in response to the action of the crown spring.

Made in sizes Nos. 1, 2, 3-A, 3 and 5; capacity, bolt threads from $\frac{3}{32}$ to $\frac{1}{2}$ of an inch.

Manufactured by the **Federal Products Corporation**, 393 Harris Ave., Providence, R. I. Price, with one button die, No. 1, \$30; No. 2, \$35; No. 3-A, \$40; No. 3, \$45; No. 5, \$60. Literature on application.

(When Writing to Advertisers, Please Mention the Automobile Journal.)



The Craig-Hunt Speedway Bodies for Ford Cars are copied from the fastest foreign and American speed styles. The metal work is of 21 gauge auto steel and all important seams are welded and finished. The flared cowl has a tendency to direct air currents over the driver's head.

The body is heavily bound with round metal, which makes it rigid and free from vibration. All wood work is of oak, fastened together with glue and screws. The seating capacity is exceptionally comfortable for two persons, having ample leg room, and the cushions, which are 32 inches wide, are upholstered with a good grade of manufactured leather over curled hair and long coiled springs.

The hood is hinged top and sides with suitable catches. The tail is of the famous French Peugeot torpedo design. It is formed over a canoe type light wood frame and is exceptionally rigid, all seams being welded.

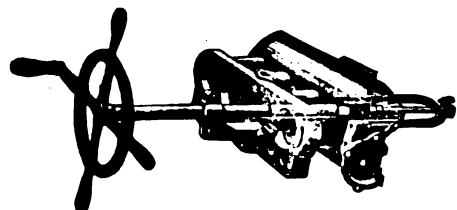
The radiator shell furnished with the body has a filler cap which screws into place in the regular Ford radiator, making it unnecessary to use another radiator, and entirely does away with the Ford appearance, the manufacturer claims.

The apron or drop is a permanent part of the body and is designed to give the car a lower appearance, covers the frame and assists in forming a streamline effect. Ample room is provided at the rear of the seat for carrying pump, jack and tools. The tool box is reached by unsnapping and removing the seat cushion. The Ford gasoline tank may be used in the tail by shortening the tank. Opening for filling the tank is on the right side in the rear of the mechanic's seat. The manufacturer states that the body is easily installed.

Manufactured by Craig-Hunt, Inc., Indianapolis, Ind. Price \$150 f. o. b. Indianapolis. Bodies shipped with priming coat unless otherwise ordered. Price for color painting, \$25 extra. Shipping weight, 250 pounds.

Heiser's Improved Cylinder Reborring Machine for the Ford Engine embodies new features for this class of work. The manufacturer claims that with the tool it is possible for a mechanic to turn out satisfactory reboring.

The tool is placed in the cylinder and fastened at each end by bolts passing through the top of the cylinder and the upper part of the base. The maker states that centering of the cutter is easily accomplished after a trial and once properly set does not have to be changed to rebore the others. Hand power is applied by a handle on the wheel for reboring and reversing the cutter. It is claimed that the cutter is self-sharpening. The tool weighs 45 pounds.



Manufactured by the Heiser Special Tool Co., Kingston, Mo. Price \$42, cash with order. Over-size pistons, complete with rings, pins and bushings, .015, .031, \$1.00; .045, \$1.90.



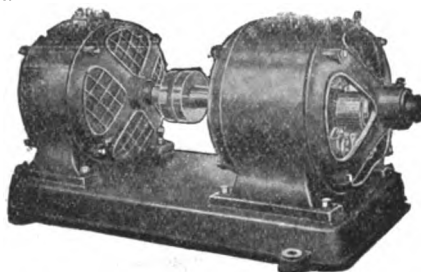
The Kantmar Autowash consists of a new substance for which the manufacturer makes many claims. In using, place a wine glassful in a pail of water and this amount, the maker claims, will be sufficient to cleanse thoroughly the dirtiest car. By its use the highly polished finish of the car is not damaged, the manufacturer states. Kantmar attacks both mud and grease with equal effectiveness, and is as cheap in price as the ordinary soaps sold for this purpose, according to the maker.

Manufactured and sold by the Woodtite Laboratories, Modesto, Cal. Prices on application. Sold to the trade in eight-ounce bottles and one-gallon cans.

The Eck Motor Generator Sets for Charging Storage Batteries, while not new to the trade, having been manufactured for the past 12 years, incorporate many novel features not generally known. They are usually wound for direct current where it is necessary to reduce the voltage from a higher to a lower voltage suitable for charging purposes. They may also be purchased for duty on alternating current such as is usually supplied in cities, transforming this current by means of the motor and generator to a direct current of suitable voltage for charging purposes.

The armature core is of thin sheet steel with slots accurately aligned, keyed to the shaft by projections in the punchings, and the windings are well insulated. The armature is baked, then dipped in armature varnish and again baked.

Brush holders are of an improved box type and are suitable for either direction of rotation. Even tension is exerted on the brush at all lengths, and the brush



is in plain sight and is easily removed when replacing new brush. Oiling is by means of a well located below the bearing and a ring over the shaft that brings the oil from the well, distributing it evenly over the bearing while the set is in operation.

A fan attached to the armature shaft supplies a current of air over the armature, keeping the interior of the motor cool. The temperature rise will not exceed 45 degrees C. All parts are standardized and are interchangeable. The usual guarantee is given by the manufacturer as to workmanship and material. Instruction books fully describe the operation of these sets.

Manufactured by the Eck Dynamo and Motor Co., Belleville, N. J. Prices and literature on application.



The Auto Top Recover consists of the necessary material to recover any automobile top, including the rear curtain, and a selection of the light to be used, either glass or celluloid.

In ordering, one should specify the name of the car, year, model and the type of light desired in the rear curtain. The recover is made at the factory with the roof and quarters sewed together and the rear curtain ready to apply to the car by the owner. Printed instructions accompany the recover, and the manufacturer claims that the recover and curtain are easily applied by anyone who can drive a car. The recover is furnished complete with all necessary fasteners, tacks and binding. A perfect fit is guaranteed when the correct name, year and model of the car are given.

Manufactured by the Liberty Top and Tire Co., Cincinnati, O. Prices and literature on application.

The Kobzy Signal for Passenger Cars has three swinging arms enclosed in a dust and dirt proof case extending from the rear number hanger and above the rear light. It is operated by a small lever located within easy reach of the driver. To operate it is not necessary to remove the hand from the wheel, as the signal is easily reached by the fingers. During the day the signal is plainly seen from the rear and at night it is illuminated by means of a special light enclosed in the top of the arm case. Current for this light is obtained from the storage battery of the car and, as the light required is small,



only a small amount of current is required. This device is especially desirable when operating a closed car. Three positions of the arms are shown, stop, left and right.

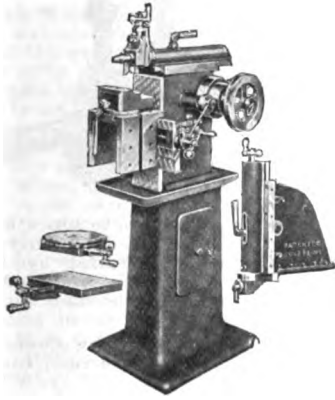
Installation is quickly and easily accomplished on any car without special tools. The signal arms are made of sheet aluminum, triple painted and varnished and self-cleaning. The lever box with the handy light attachment is adjustable to any height, length and angle to fit the convenience of the driver and is fastened solidly to the wheel post. The Kobzy Signal is guaranteed for one year and will be replaced or repaired during that length of time if it does not give satisfaction.

Manufactured by the Chicago Die and Specialty Co., 327 So. La Salle St., Chicago, Ill. Prices, East of Rocky Mountains, \$17; West of the Rocky Mountains, \$18.

(When Writing to Advertisers, Please Mention the Automobile Journal.)

The Rhodes Shaper and Slotters comprise a complete line for the service station machine shop and the garage repair shop, with several sizes in both power and electric motor driven machines.

In the Rhodes shapers the column is of unusual length, giving a longer and wider bearing to the ram. The main gear is attached close to the side of the column so that in making heavy cuts there can be no springing of the walls of the column. The cone pulley is mounted on a bearing fastened rigidly to the column, which receives all strain from the tension of the



belt. The base is designed to afford a rigid foundation.

The ram is heavy and has a long, wide bearing in the column, obtaining the maximum wearing surface. The ram has a quick return and is provided with felt oilers, which keep the bearings lubricated. The position of the ram in relation to the work and the length of the stroke can be changed instantly. The ram is equipped with a gib extending the whole length of the column and has an adjustment for taking up wear.

The driving cone has three large diameter steps, arranged in regular progression, by which it is possible to obtain the necessary cutting speeds on all metal from soft brass to hard steel. The cone is mounted on a sleeve bearing, which insures proper meshing of the driving pinion and adds life to the running parts.

The driving pinion and driving shaft are made of one piece steel, making a rigid construction. The cross rail is strongly gibbed to the column by a square gib on one side and an angular gib on the opposite side, which assures perfect alignment, and the gibs are adjustable to allow for taking up wear. The tool head is graduated and swivels to any angle through an arc of 90 degrees. The down feed screw has a graduated collar, reading to .001. The tool post screw is made of special steel and hardened, as is also the tool rest.

The table is of standard box form with T slot on top and V slot on the side, and the side of the table is drilled to allow the clamping of work in any desired position. The table is of ample size for supporting and strapping down a large variety of work when the vise is removed, and is equipped with a taper gib for tak-

ing up wear. The vise is of strong construction and is graduated to 90 degrees either side of 0. The jaws are made of tool steel, hardened and ground. The vise is equipped with swivel jaw.

The cross feed is equipped with a lifting and turning pawl, which is used for engaging or disengaging feed. It adjusts itself automatically for any position of the cross rail and does not require loosening or tightening of set screws to adjust. The cross feed screw is equipped with a graduated collar reading to .001.

The regular equipment of the seven-inch horizontal shaper includes swivel vise, wrenches and counter shaft. This size is the one usually recommended for the service station machine shop and answers practically all purposes where a shaper is required. However, for those who wish to combine the horizontal and vertical shaper in one machine, the company manufactures a second machine for this type of work, having a vertical head. The specifications for this latter machine are similar to those of the horizontal type and the heads are interchangeable. One may purchase the two heads for the one machine, making use of the single base. Where it is required to drive such a machine with an independent motor, the Rhodes company is prepared to furnish either style with the motor drive.

Manufactured by the Rhodes Manufacturing Co., Hartford, Conn. Prices and literature on application.

The Stewart Truck Speedometer differs from the passenger car speedometer and is of heavier construction to stand the strain and vibration of truck service. It is built as carefully as the passenger car type and of the same materials.

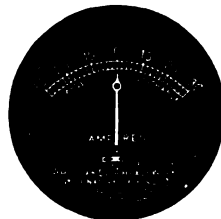
Instead of setting flush with the dash the truck speedometer is held away from the dash by a suitable mounting. The unit is bolted to the dash by four bolts.



The speed registers from 0 to 50 miles, the trip to 100 and the total to 100,000 miles. The trip may be set back to zero from any point up to 100 miles by a knurled nut at the side.

Manufactured by the Stewart-Warner Speedometer Corporation, Chicago, Ill. Price, \$35.

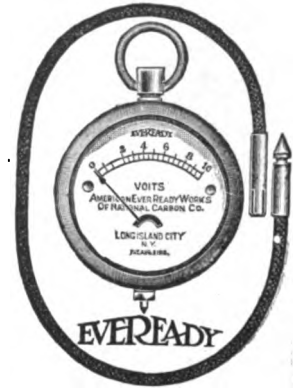
Eveready Pocket Meters and Dash Board Instruments. Eveready Pocket Meters for testing dry cells and dash board instruments are for showing the charge and



discharge of a generator and storage battery outfit in a car. The pocket meters are of a handy size and the cases are built of brass, heavily nickel plated and polished. The dials are of metal, etched in black with raised figures on dull silver background and are accurately scaled. Each meter is supplied with a 10-inch lead fitted with proper terminals. The instruments are "dead beat," giving a correct reading instantly and regardless of

whether the meter-terminal is placed on the positive or negative pole of the battery. No permanent magnet is employed.

The dash instrument is simple and rugged in construction, dust and water proof. Movement of the pointer is "dead beat" through the use of an aluminum vane moving in a partially closed air chamber. The moving element is light and is supported on hardened steel pivots. The pointer will instantly follow the smallest change of current flow, and, as the torque produced by the magnetic field is very high, the vibration of the car will

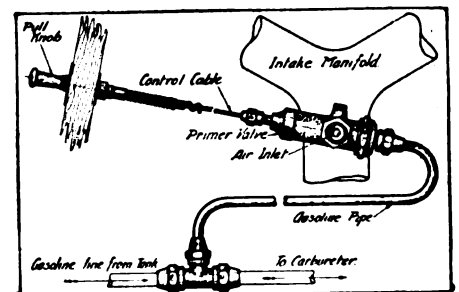


not affect the reading. Regularly finished in dull black enamel with black dial, but may be furnished in polished nickel with silver finish dial if desired.

Manufactured by the American Ever Ready Works, Atlanta, San Francisco, Long Island City, N. Y., and Chicago. Price, pocket meters, No. 1002, 0-35-amps, \$1; No. 1003, 0-35-amps, \$1.30; No. 1005, 0-10-volts, \$1.10. Dashboard instruments, \$3.50 each.

The Copley Primer may be attached to practically any car or truck and greatly facilitates the starting of the engine, especially during cold weather. It consists of a priming wire located on the dash, a pump fastened to the inlet manifold by a threaded connection and a short length of copper tubing connecting the pump with the gasoline line.

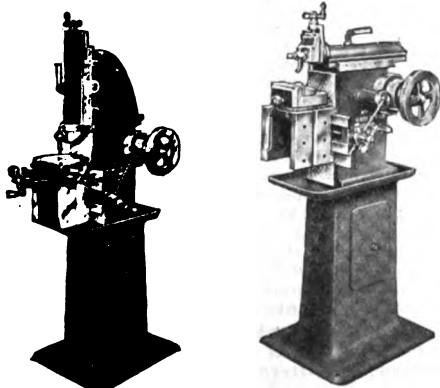
Gas is drawn from the gasoline feed line into the pump by the suction of the pistons in the cylinders. By pulling out the rod in the dash and allowing it to spring back, raw gasoline is injected into the intake manifold of the engine for starting. The manufacturer claims that the primer



is so made that it is possible to operate the engine after the initial start for several minutes by means of the primer without depending upon the carburetor. At the side of the pump chamber a small air inlet is located and this opening, which is governed by a check valve, allows a predetermined amount of air to enter with the gas, giving the engine the proper mixture for operating a short time.

The gasoline, in passing from the pump chamber, passes through a choke chamber, entering the manifold at a high velocity. The gasoline is thoroughly atomized and broken into a mist before reaching the combustion chamber.

Manufactured by the Bay State Pump Co., 100 Purchase St., Boston, Mass. Price, \$5.



(When Writing to Advertisers, Please Mention the Automobile Journal.)

The Stewart Hub Odometer for Ford Trucks is easily attached to the front hub by removing three bolts and fitting the odometer in place. The driving mechanism receives its power from a suitable connection on the axle. The odometer is guaranteed by the manufacturer, who claims that by its use one can check the number of miles traveled and get an ac-



curate account of the gasoline and oil consumed. From these figures it is possible to tell what it costs per mile to operate the truck. It is also possible to keep track of the mileage made by the tires.

The odometer is fitted with an oil plug and the spindle and bearings may be lubricated without removing the hub cap. A cap screws into the end of the hub cap, covering the face of the odometer, keeping it clean and readable. It is easily attached in a few moments without extra tools.

Manufactured by the Stewart-Warner Speedometer Corporation, Chicago, Ill. Price for Fords, \$12.

Rayfinish for Passenger Cars is a chemical product for brightening the painted surface. It consists of a liquid that is applied to the surface to be cleaned with a piece of cheese cloth and after drying slightly is removed with a clean piece of cheese cloth or other soft cloth material, leaving the painted surface in a polished state.

The manufacturer claims that by its use cars that have first been washed and thoroughly dried may be gone over with

RAYFINISH
AUTO PASTE POLISH

Rayfinish, removing all stains, dullness, tarnish, oil and grease spots. Polishing with the dry cloth will restore the luster to the finish that will save the expense of repainting. Rayfinish is easy to apply and requires very little rubbing.

Manufactured by the Ray Chemical Co., New York, N. Y., and Newark, N. J. Prices on application.

The All-Wanta Ford Seat Cushions for the Ford car are different from the cushions ordinarily used in the Ford. They are constructed of better material, have longer and better springs and are covered with a better grade of leatherette.

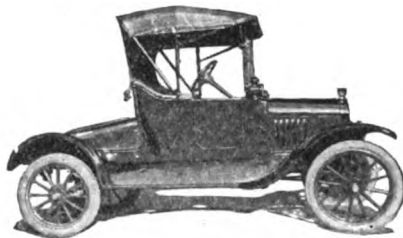
The cushion for the front seat is divided, allowing one-half the cushion to be lifted when filling the gasoline tank. The rear cushion is constructed in a single



section. The All-Wanta seat cushion is made with a steel frame construction, electrically welded, and has 32 high tempered coil springs securely fastened to the steel frame.

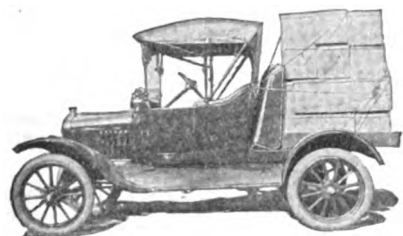
Manufactured by the Fort Pitt Bedding Co., Liverpool and Preble Avenue, N. S., Pittsburgh, Pa. Price, \$10.

The Utility Disappearing Truck for Fords consists of a box made of heavy gauge steel and finished in black baked enamel to match the finish of the Ford. No rivets or bolts are used in its construction, as all joints and seams are ace-



tylene welded. It is placed at the rear of the Ford roadster and when not in use slides in and is covered by the turtle deck of the Ford. It is easily installed by anyone with a hammer and wrench in one hour the manufacturer claims.

By its use the Ford may be used for a passenger car with no suggestion of the

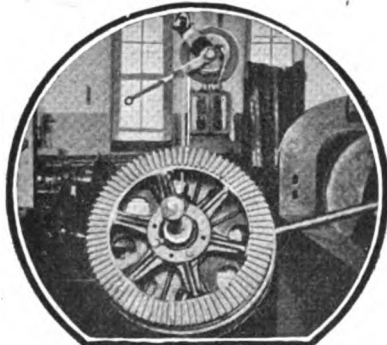


truck showing. When called upon for truck work the deck is lifted, the box slides out, forming a body that is capable of carrying 1000 pounds.

Manufactured by the Hill Pump Valve Co., Archer Avenue, Canal and 23rd Streets, Chicago. Price, \$38.50.

The Bickley Power Puller consists of a pulling device operated by hand by which the power of the pull is multiplied many times. The manufacturer claims that the ratio of pulling is adjustable from 90.1 to 150.1, which makes it possible for one man to exert a draw bar pull up to a ton easily.

The pulley is enclosed in an oil tight case operating on roller bearings and lubricated with graphite, as are also the

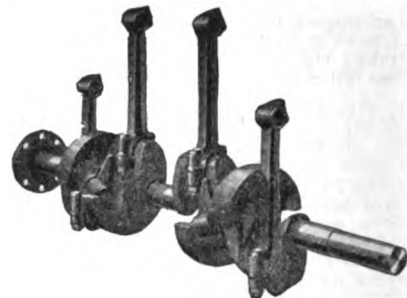


gears by which the reduction is gained. The pulley is operated by a short lever. When in use a wire rope is fastened to the eye of the pulley and passed around some stationary object, like a post, beam or tree. The tow line is then fastened to the object to be towed and by working the lever forward and back the towed article is easily moved.

The maker recommends this device to automobilists, as it may be easily carried in the tool box for emergency use as when stuck in the mud or fording streams. The device weighs 12 pounds and packs into a box 8 1/4 by 7 1/4 by 3 1/4 inches. The cable supplied is one-quarter inch steel and enough lengths are furnished to make up 23 feet total.

Manufactured by Bickley Manufacturing Co., Philadelphia, Pa. Price, \$19 complete. Guaranteed.

Dunn's Counterbalances for All Ford Cars consists of four weights that are attached to the crankshaft of the Ford engine at the oblique arms between the connecting rod bearings. Each is composed of two weights fastened together by means of two bolts passing through their centers. The object of their use is to steady the motion of the crankshaft



and in a measure eliminate vibration, allowing engine to operate smoothly. The weights are easily installed by a mechanic, an hour usually being sufficient, and once in place they become a permanent part of the car.

Manufactured by the Dunn Counterbalance Co., 115 North 15th Street, Clarinda, Ia. Price, per set, \$12.

The McCaskey Safe Register System is a system of account keeping that is suitable for the service station and garage owner who wishes to have his accounts in such shape that he may refer to any account at a moment's notice.

The outfit consists of a cabinet, suitably indexed and equipped with clips for each account, and trays for holding the accounts. The outfit is only limited to



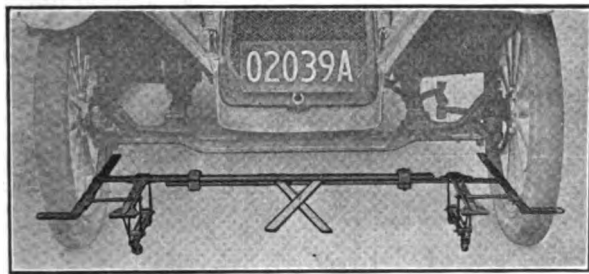
the number of accounts so kept and occupies but little space in the garage or service station office.

By its use the manufacturer claims it is possible for the customer to see at the time the transaction takes place, and while the details are fresh in his mind, whether or not his account is correct after the charge has been added or a credit deducted. It enables the customer to know at all times what he owes, so that he can provide to meet it.

The McCaskey system enables the garage or service station owner to realize fully on his credit, and, in addition, to handle all charge transactions; make the original entry, post and balance the account with a statement to date for the customer, with but one writing, the original entry. In doing this every safeguard is thrown around the account both with regard to errors and possible loss by fire.

Manufactured by the McCaskey Register Co., Commercial Department, Alliance, O. Prices and literature on application.

(When Writing to Advertisers, Please Mention the Automobile Journal.)



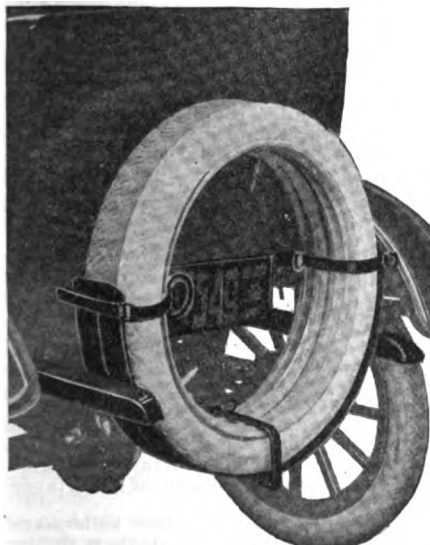
Duby's Wheel Gauge consists of a metal gauge on casters that is placed on the floor of the garage between the two front wheels of a car or truck and by means of suitable indicators shows the alignment of the front wheels either at the front or back or both. Arms at the side in the form of a tri-square fit across the front of the tire and pass back along the inside of the wheel.

The arms are manipulated by two crossed levers at the center that are positioned by hand. Two metal rods connect the arms with the center levers, being held in place by clamps, the rods are allowed to slide loosely in the clamps. It is claimed by the manufacturer that this device is a time and labor saver in the service station and that it will show the alignment of several cars during the time taken to show one by some of the old methods.

Manufactured by J. F. Duby, 1357 Blue Hill Ave., Mattapan, Mass. Price, \$15.

Yankee Combination Tire Holder and Rear Guard for Ford Cars is an unusually heavy, well braced tire carrier that is fastened at the rear of either the Ford roadster or touring car and acts as a rear guard or bumper, as well as a tire carrier equipped for carrying two tires.

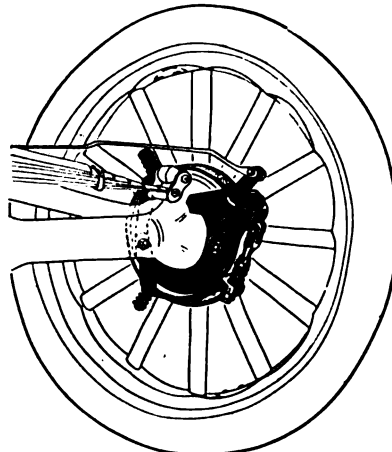
The construction of the carrier is steel throughout, providing ample strength for travel over rough roads. The cradle is rib reinforced and is further supported by a firmly riveted cross brace, which also makes a secure fastening, and a protected position for the license tag and rear lamp. The side arms are of steel, pressed into



angle shape, of unusual strength. Shoulders are provided on the arms which butt up against the cross member of the frame, allowing great strength when acting as a rear guard. Two lag screws fasten the carrier to the body, holding it in place securely by means of the screws and shoulders. Special fixtures are provided where wire wheels are to be carried.

Manufactured by the International Metal Manufacturing Co., Philadelphia. Price, \$11.85.

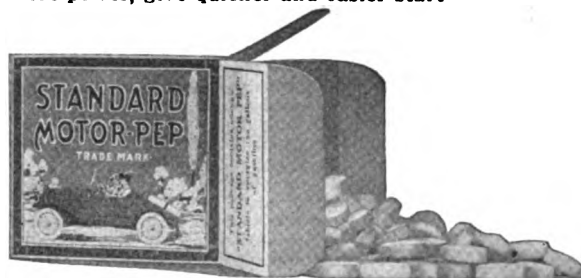
Pla-Safe Brake for Ford Cars is a brake shoe that fits over the brake drum of the Ford rear wheel and takes the place of the regular emergency brake. The band to which the lining is fastened is of steel, supported in such a manner that the shoe will not drag on the drum. The manufacturer claims that the shoe will not rattle or ride the drum. Suitable toggle joints are provided for the action and release of the shoe and also provides for fastening



the shoe to the axle flange. The usual emergency brake lever is connected to the shoes in much the same manner as when used with the regular brake. The device is made throughout of the best of material and is easily attached by anyone handy with tools. The claim is made that the brake is positive in action and will hold the car on the steepest grades.

Manufactured by the Pla-Safe Brake Co., Brookville, Pa. Price, \$12.50 per set.

Standard Motor-Pep is a chemical compound in tablet form that is dissolved in the gasoline and energizes it. The manufacturer claims that its use will cut the fuel bills, enable the engine to develop more power, give quicker and easier start-

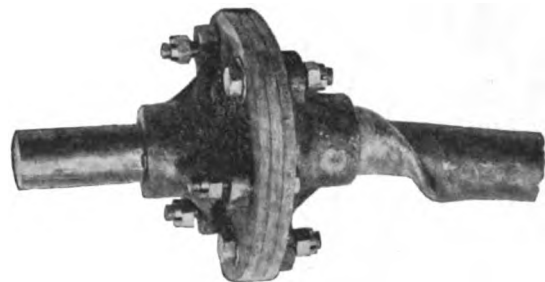


ing, snappier pick up and one-eighth more mileage on the gasoline consumed.

Manufactured by the Utilities Co., Cleveland, O. Price, 50 cents per box. Jobbing trade solicited.

The Hamilton Strictly High Grade Heavy Red Antimony Inner Tube is an unusually heavy red tube that the manufacturer claims is heat resisting, conforms readily to the casing, will not leak at splice or valve, is durable and economical from a service standpoint and is fully guaranteed.

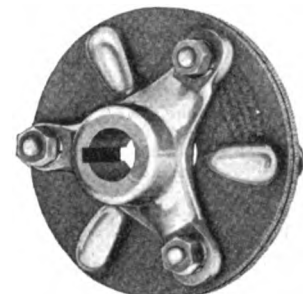
(When Writing to Advertisers, Please Mention the Automobile Journal.)



Thermoid-Hardy Joints are composed of three sections, each made of several thicknesses or sheets of fabric and rubber placed fanwise to each other so that the layers of cotton fabric overlap one another, giving great strength. After the layer is completed, holes are made, spaced the proper distance apart and reinforced with fluted steel washers. The three layers are placed side by side and bolted to the joint ends by bolts and castellated nuts, the nuts being securely held in place by cotter pins.

The Thermoid-Hardy Joints are used for universal connections on the drive shaft of trucks, passenger cars and tractors and during the war were used on the tanks.

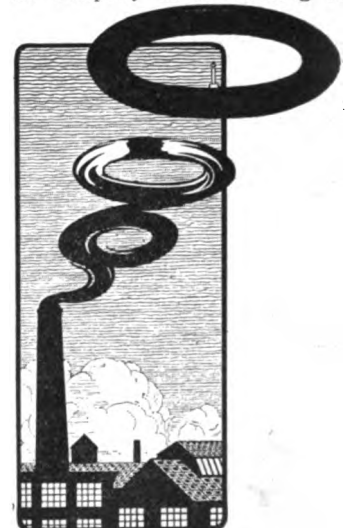
The manufacturer claims that their use



causes a saving in wear and tear on the gears in the transmission case and rear system, allowing the car or truck to start with a more gradual application of power, thereby reducing the strain and shock to the car. The flexible discs are so elastic that when the clutch is thrown in and the forward end of the propeller shaft can revolve five degrees or more before the axle is forced to turn. The result, the maker states, is a smooth, gradual application of power with no shock or vibration.

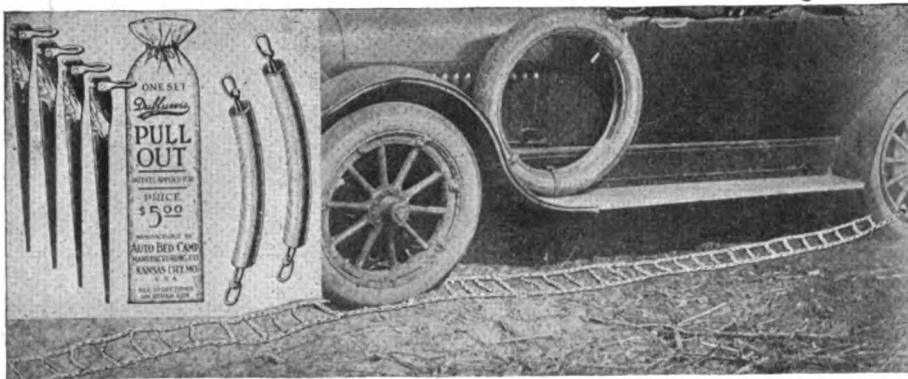
Manufactured by the Thermoid Rubber Co., Trenton, N. J. Prices on application.

This tube is particularly a jobbing house or accessory supply store proposition and the company manufacturing it



wishes to hear from this class of trade, as it has a particularly interesting offer.

Manufactured by the Hamilton Rubber Manufacturing Co., Trenton, N. J. Prices and literature on application.



The A-B-C Dublervis Pull Out is a device to be used by the motorist when the rear drive wheel of a car is in the mud, its use providing traction in such a manner that the car is able to move out of the mud under its own power. It consists of four steel stakes and two pieces of chain with rubber sleeves.

The chain is laid out on the ground either ahead of the wheel or back according to the direction in which the driver wishes to go. The ends are securely fastened around a spoke and the felloe of the wheel. The forward end of the chain is fastened by the stakes driven into the ground, with the notches of the stakes in

the forward position or against the pull.

The manufacturer states that the stakes should be forced into the ground in a vertical direction and not on a slant. In very soft ground it is simply necessary to force the stake into the ground lightly, the friction of the chain upon the surface of the ground being sufficient to hold the chain tight. In very soft stretches of sand or mud two mud chains should be joined together and spread out forward under tread of the front tire.

Manufactured by the Auto Bed Camp Manufacturing Co., 554 10th Avenue, New York and 1504 Grand Avenue, Kansas City, Mo. Prices on application.

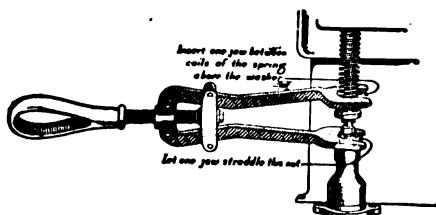
The Raybestos Attaching Kit consists of a supply of the proper size rivets and the necessary tools, instructions, etc., for attaching Raybestos lining to the brake shoes of automobiles and trucks. The kit



is supplied in a neat wooden box, having each article in a separate compartment. The instructions are very explicit and besides showing each step in applying the lining, tells which tool to use and how to use it in completing the operation.

Manufactured by the Raybestos Co., Bridgeport, Conn. Price, \$3.75.

The Viehek Valve Lifter is a tool for compressing the valve springs while removing the key or pin at the bottom of the stem. It consists of two forked arms fastened at the top by means of hinged joints to a center plate. The bolt that operates the tool passes through a threaded opening in the plate to a center cross plate that is movable on the forked arms. To operate the tool the forks are placed one at the bottom of the spring and the other over the push rod and resting around the adjusting nut of the push rod.

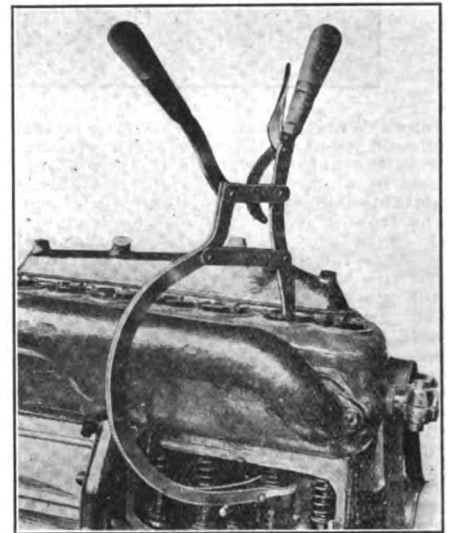


Turning the bolt forces the center plate carrying the end of the bolt to slide toward the hinged joint of the arms, compressing the spring and allowing the pin in the end of the stem to be removed. Loosening the bolt allows the tool to be removed and placed in position for compressing the next spring. The device is a drop forging, guaranteed against breakage, is quick in action and has a very powerful lift.

Manufactured by the Viehek Tool Co., Cleveland, O. Price, per dozen, \$15.

(When Writing to Advertisers, Please Mention the Automobile Journal.)

joining the first member by the hinged fastenings and terminating at the top in a handle. A ratchet and release are provided so that the operator may hold the spring in the compressed position as long as desired. Releasing the ratchet frees the arm and allows the spring to assume its natural position. The device is heavy and powerful enough to compress the



springs on heavy truck engines as well as the springs on the lighter passenger car engines. The manufacturer also makes a lighter compressor for the Ford car on the same principle.

Manufactured by the Mapson Manufacturing Co., 622 E. Eighth Street, Los Angeles, Cal. Price, \$15. Ford size, \$25.00.

The Se-Co Roller Bearing for Fords and Chevrolet 400 Cars is designed to replace the front bearings of the Ford and Chevrolet 490 cars with a permanent roller bearing. It consists of an outer race with a tapered bore and an inner race tapered on the outside. Between the inner and outer races are inserted rolls which are held in line by a suitable cage. The rolls are tapered to conform with the tapers of the two races and all tapers converge at one point on the axis of the journal.

The Se-Co roller bearing is constructed from chrome steel of about .60 carbon. The races are hardened all through and are machine tooled rough and finished by grinding to an accurate limit by a gauge, both for size and angularity. The roller



to sliding tube and serves as a reel for winding up the cord when the lamp is not in use. The sliding tube and reel frame are finished in a rubberoid black enamel, all other parts being nickel plated.

The type CB is equipped with concentrated bulls eye and is convenient for reading road signs, house numbers, etc. Dimensions of lamps are 1 1/4 inches diameter by eight inches long. Each lamp is packed in a substantial screw cap tube.

Manufactured by the Cuno Engineering Corporation, Meriden, Conn. Prices, type C, single and double wire, each, \$2.20; type CB, bulls eye, single and double wire, \$2.40.

Mapson's "Perfection" Valve Lifter is a device for compressing the valve springs on L and T-head engines and which exerts a powerful pressure with little effort on the part of the operator. The fork is adjustable for any size stem. It consists of a long arm that passes out and around the engine to the top, where it is securely held by two hinged joints, the upper end terminating in a suitable handle. The other arm has a pointed end that centers in the head of the valve, the upper end

is made from soft steel and case hardened. The manufacturer states that the hardening process does not distort the roller even to the extent of .00025 of an inch. This roller is machined, before hardening to within .0005 of an inch, and polished after the hardening process. By this method, it is claimed, a uniform case is obtained, the soft center of the roller giving the maximum amount of resistance against breakage.

The retaining cages for these rollers are pressed out of cold rolled steel, with the depression to receive the conical end of the rollers struck at the same time, thus leaving sufficient clearance between the roller and the cage to allow for the free action of the rollers to align themselves properly with the tapered axis of the bearing.

It is claimed that this method of construction eliminates all excess friction usually found in bearings of this type. All bearings are thoroughly tested before leaving the factory by a special testing apparatus with "go" and "no go" gauges.

Manufactured by the Stacks Engineering Co., 216-218-220 West Ontario St., Chicago. Prices and literature on application.

Space For Jobbers' Exhibition Is Over-Subscribed

Commissioner Webster Announces That Every Indication Points to Show Being Most Successful and Interesting Ever Held

INTEREST in the exhibit to be held under the auspices of the Automotive Equipment Association in the Temple in Chicago, Nov. 3 to 8, has already passed the most sanguine expectations of the committee in charge of arrangements, and there is every indication that the affair will be the most interesting one of its kind ever held.

The space in the Temple has been largely over-subscribed, and it is a matter of regret that the Temple has not a greater capacity in order that applications for space still coming in might be taken care of. The committee has been forced to open up the space on the stage to care for the earlier of the late applicants, although this space was not to be utilized under the original plan.

"This exhibit seems to have struck a popular chord and to have met a long felt want," announces Commissioner William M. Webster in behalf of the committee. "The financial success of the enterprise has long since been assured beyond any doubt; in fact, that phase was never in doubt for a moment. But the pluck, spirit and enterprise which the manufacturers have entered in this matter and in taking hold of the project reflects great credit on them and is one typical of the wide-awake and progressive industry that they are engaged in.

"All that now remains is the staging of the exhibit by the Atlantic Decorating Co., whose reputation for unique accomplishment in this matter is too well known to need comment, so that when the great doors of the Temple swing open on Nov. 3 all that will be left to crown this initial movement and exhibit with the wonderful success it so largely deserves is to have the jobbers come forward and lend it their support and encouragement.

"Present advice and indications are that they will not be wanting, and when the curtain rings down on this magnificent setting on the day of the final adjournment, in the spirit of good fellowship and on the throne of success, the manufacturer and the jobber each may say to the other, 'Well done, thou good and faithful friend, and as we have met with such great success and in the midst of plenty, may we hope for greater success in 1920.'"

The Congress Hotel has been selected as headquarters for the delegates attending the convention. The hotel management has promised to take care of the entire delegation, providing reservations are made with as little delay as possible

with John Burke, manager.

The following will have exhibits in the Temple:

Victor Manufacturing and Gasket Co., Chicago; Auto Metal Parts, Co., Des Moines, Ia.; Edison Lamp Works of General Electric Co., Harrison, N. J.; Higgins Spring and Axle Co., Racine, Wis.; Advance Automobile Accessories Corporation, Chicago; Marvel Accessories Manufacturing Co., Cleveland, O.; Hall-Thompson Co., Hartford, Conn.; Shurnuff Manufacturing Co., St. Louis, Mo.; Perkins-Campbell Co., Cincinnati, O.; Columbus Varnish Co., Columbus, O.; Albertson & Co., Sioux City, Ia.; B. & W. Manufacturing Co., Chicago; Hawthorne Co., Bridgeport, Conn.; Black & Decker Manufacturing Co., Baltimore,

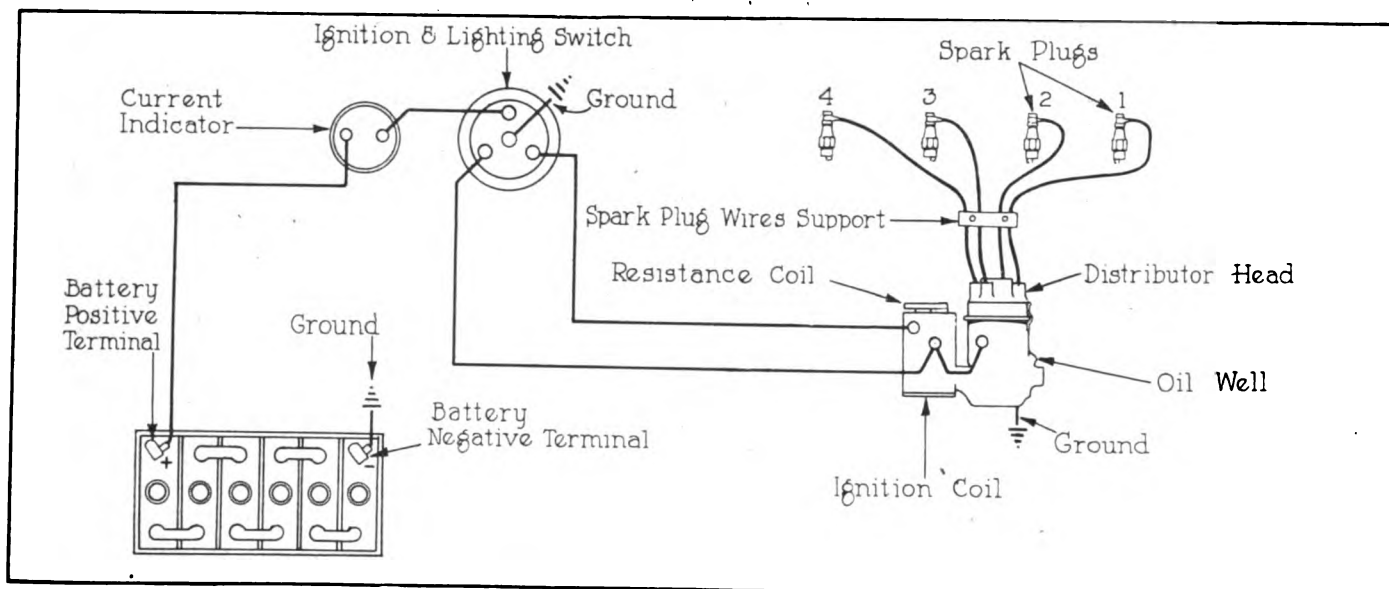
Weaver Manufacturing Co., Springfield; K-D Lamp Co., Cincinnati, O.; Walden-Worcester, Inc., Worcester, Mass.; Sharp Spark Plug Co., Cleveland, O.; Hill Pump Valve Co., Chicago; Judd & Leland Manufacturing Co., Clifton Springs, N. Y.; Apco Manufacturing Co., Providence, R. I.; Coe-Stapley Manufacturing Corporation, Bridgeport, Conn.; Sunderland Manufacturing Co., Chicago; Van Briggie Motor Device Co., Indianapolis, Ind.; Sterling Manufacturing Co., Cleveland, O.; E. A. Cassidy Co., New York; Arrow Grip Manufacturing Co., Glens Falls, N. Y.; Davies-Young Soap Co., Dayton, O.; Metal Specialties Manufacturing Co., Chicago; Northwestern Chemical Co., Marietta, O.; Fulton Co., Milwaukee; Atwater Kent Manufacturing Works, Philadelphia; K-W Ignition Co., Cleveland, O.; C. A. Shaler Co., Waupun, Wis.; H. W. Johns-Manville Co., New York; Macbeth-Evans Glass Co., Pittsburgh; Kellogg Manufacturing Co., Rochester, N. Y.; X Laboratories, New York; Challoner Co., Oshkosh, Wis.; Imperial Brass Manufacturing Co., Chicago; J. & B. Manufacturing Co., Pittsfield, Mass.; Champion Ignition Co., Flint, Mich.; American Chain Co., Bridgeport, Conn.; Splittdorf Electrical Co., Newark, N. J.; Anderson Electric Specialty Co., Chicago; Metal Stamping Co., Long Island City, N. Y.; Western Manufacturing Co., Oskaloosa, Ia.; Gemco Manufacturing Co., Milwaukee, Wis.; Mayo-Skinner Manufacturing Co., Chicago; Heiser Special Tool Co., Kingston, Mo.; Dayton Wire Wheel Co., Dayton, O.; Motor World, New York; Dole Valve Co., Chicago; Beneke & Kropf Manufacturing Co., Chicago; Federal Rubber Co., Cudahy, Wis.; New Era Spring and Specialty Co., Grand Rapids, Mich.; Pyrene Manufacturing Co., New York; Klaxon Co., Newark, N. J.; Copeman Laboratories, Inc., Flint, Mich.; Clover Manufacturing Co., Norwalk, Conn.; Interstate Electric Co., New Orleans, La.; Durkee-Atwood Co., Minneapolis; Van Sicklen Speedometer Co., Elgin, Ill.; Badger Manufacturing Corporation, Milwaukee; Milwaukee Auto Engine and S. Co., Milwaukee; Tuthill Spring Co., Chicago; J. H. Haney Co., Hastings, Neb.; Bonney Vise and Tool Works, Allentown, Pa.; Frank Mossberg Co., Attleboro, Mass.; Spencer Metal Products Co., Spencer, O.; Pennsylvania Piston Ring Co., Cleveland, O.; Romort Manufacturing Co., Chicago; Wire Wheel Corporation of America, Buffalo, N. Y.; Stiles-Gilliland Manufacturing Co., St. Louis, Mo.; Russell Manufacturing Co., Middletown, Conn.; Motor Specialties Co., Waltham, Mass.; Moto Meter Co., Boston; Central Brass and Fixture Co., Springfield, O.; E. A. Laboratories, Inc., Brooklyn, N. Y.; Stevens & Co., New York; Burd High Compression Ring Co., Rockford, Ill.; National Standard Co., Niles, Mich.; Paul G. Niehoff Co., Chicago; Chas. O. Tingley Co., Rahway, N. J.; Brunner Manufacturing Co., Utica, N. Y.; Gardner Governor Co., Quincy, Ill.; Atlas Specialty Manufacturing Co., Chicago; Silveco Co., South Bethlehem, Pa.; Edgar C. Guthard Co., Chicago; Au-To Compressor Co., Wilmington, O.; Inland Machine Works, St. Louis, Mo.; Continental Piston Ring Co., Memphis, Tenn.; L. P. Halladay Co., Streator, Ill.; Walker Manufacturing Co., Racine, Wis.; Curtis Pneumatic Machine Co., St. Louis, Mo.; Howe Lamp and Manufacturing Co., Chicago.



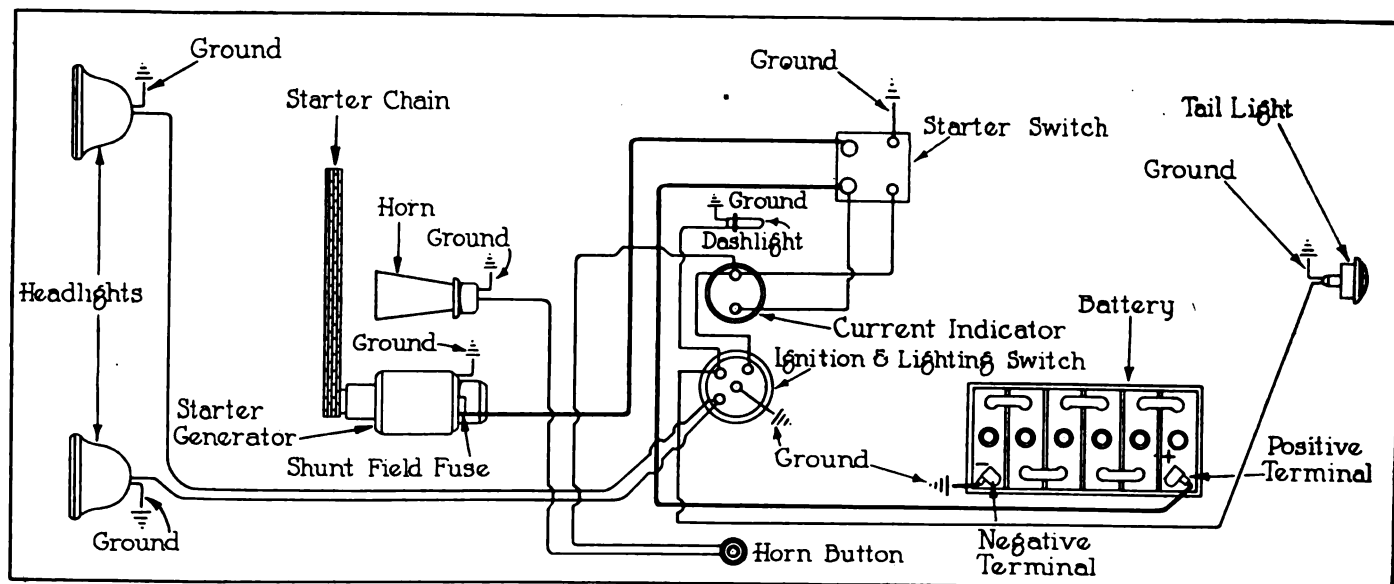
WILLIAM M. WEBSTER.
Commissioner of the Automotive Equipment Association.

Md.; Packard Electric Co., Warren, O.; E. V. Hartford, Inc., Jersey City, N. J.; Sinclair Refining Co., Chicago; General Asbestos and Rubber Co., Charleston, S. C.; Nu Back Manufacturing Co., St. Louis, Mo.; Double Fabric Tire Co., Auburn, Ind.; Jefferson Electric Manufacturing Co., Chicago; Goodrich-Lenhart Manufacturing Co., Philadelphia; Rowe Calk and Chain Co., Hartford, Conn.; Gray & Davis, Inc., Boston, Mass.; Motor Parts Co., Philadelphia; Indiana Lamp Co., Connersville, Ind.; A. R. Mosler & Co., Mt. Vernon, N. Y.; McQuay-Norris Manufacturing Co., St. Louis, Mo.; Champion Spark Plug Co., Toledo, O.; A. Nelson Manufacturing Co., Chicago; Gates Rubber Co., Denver, Col.; H. & D. Co., Inc., Goodland, Ind.; Thermoid Rubber Co., Trenton, N. J.; L. H. Gilmer Co., Philadelphia; Standard Woven Fabric Co., Walpole, Mass.; Allen Auto Specialty Co., New York; Peters & Heron Co., Columbus, O.; E. Edelmann & Co., Chicago; Corcoran Manufacturing Co., Cincinnati, O.; Van Cleef Bros., Chicago;

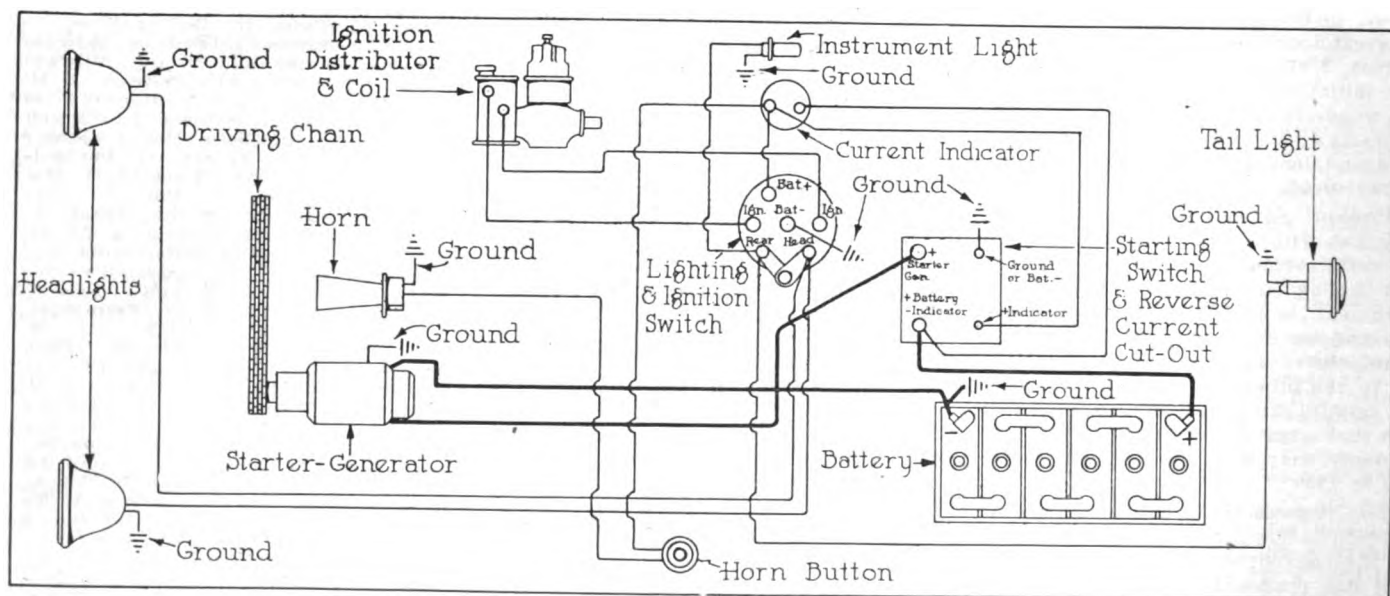
Dodge Wiring Diagrams for Northeast System



Ignition System.



Starting and Lighting System.



Complete Wiring Diagram of Northeast System Used in Dodge Cars.

AUTOMOBILE SPARK PLUGS SHOULD RECEIVE PROPER CARE

Little Intelligent Attention Adds to Their Life and Gives Them More Pep—Cleaning Them is Comparatively Simple Operation

THE sparking part of the automobile's mechanism is one of the most important, but, because with most cars the plugs give little trouble, the average motorist simply lets them alone and when anything goes wrong puts in a new plug, deeming that the old one has given long enough service for the money he paid for it. As a matter of fact, a little intelligent attention to the plugs occasionally would not only lengthen their life, but give them added pep and make motoring more of a pleasure than it is.

To clean a plug is no job requiring the services of an expert; any novice may acquire the art by a little practise—using old plugs first. Because of the changing grades of gasoline sold these days more and more trouble is experienced from fouling plugs. The higher grades of gas-

vided it is of the separable kind, place the hexagon shell in a vise. Then with a good wrench (not a Stillson) remove the packing nut or gland, working slowly and carefully so that neither the porcelain be cracked nor the gasket between porcelain and shell destroyed. Not all have this gasket, but where used it would be well to keep new ones on hand along with new porcelains to replace those which develop defects.

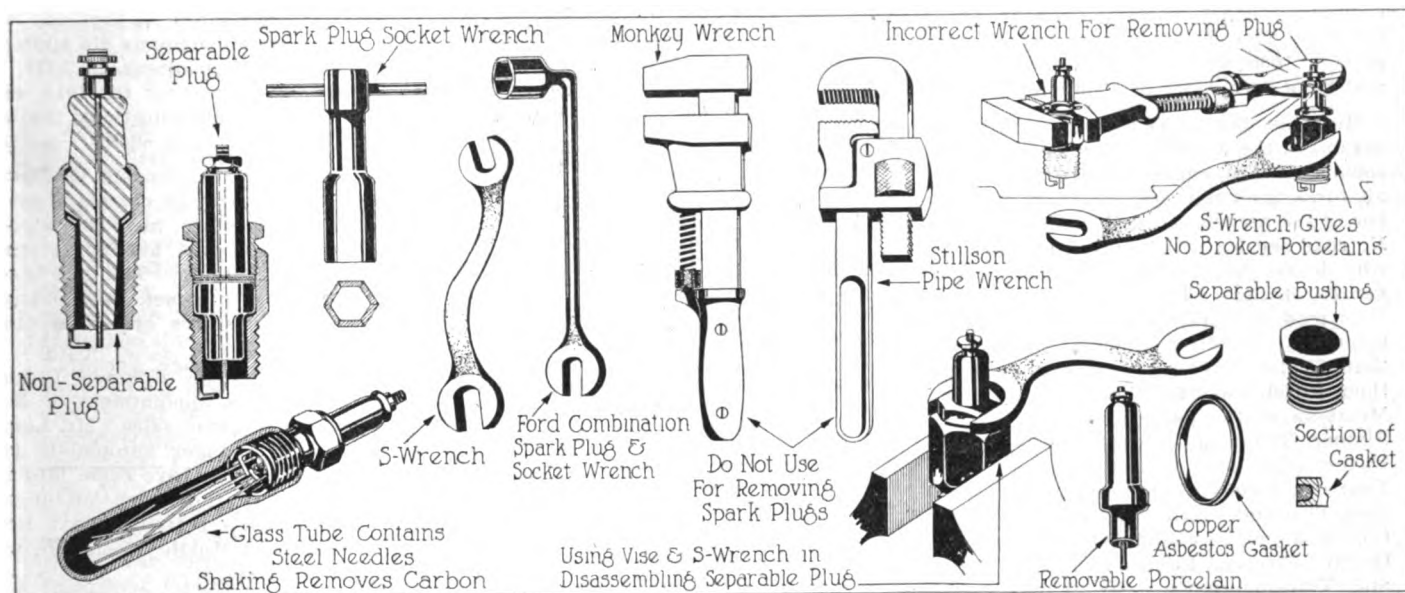
Cleaning off Carbon.

With the porcelain removed, take a rag and gasoline and clean off all semblance to carbon and oil from the surface. Do not use a knife, file, steel scraper, sandpaper, emery paper, emery cloth, or any other abrasive substance on the porcelain. The surface of this member is glazed and is intended to be perfectly

the cleaning. In reassembling as much care is needed as in taking the plug apart to insure that it will be leakproof. It should be tested when in the cylinder for leaks by squirting a few drops of oil about the packing gland and about the base and watching for bubbles under compression.

When reassembled the spark plug should be adjusted. With magneto ignition the usual gap is 1-64 inch; with battery ignition about 1-32 inch. Experimenting between these two extremes should develop the ideal gap for the particular motor.

Some plugs cannot be separated and while it is a little harder to clean out carbon, these seldom leak and cause loss of compression. If the plug has layers of mica instead of porcelain for insula-



oline burn more perfectly. Gasoline is a hydro-carbon and where there is perfect combustion there is little free carbon; this is deposited all over the interior of the combustion chamber. When this deposit becomes too heavy the compression of the cylinder is increased and there may be trouble from preignition due to high compression. But when it is deposited on the spark plugs too thickly the effect is just the reverse. There is no ignition. This makes frequent cleaning of the plugs desirable, if not imperative.

First Operation.

The first operation in cleaning a plug is removing it from the cylinder. Some are content to use any old thing regardless of damage to the plug. The wise motorist will have a spark plug wrench to fit the type of plugs he is using—and will use it. The other fellow will have cracked porcelains and other troubles. When the plug is removed from the cylinder, pro-

vided it is of the separable kind, place the hexagon shell in a vise. Then with a good wrench (not a Stillson) remove the packing nut or gland, working slowly and carefully so that neither the porcelain be cracked nor the gasket between porcelain and shell destroyed. Not all have this gasket, but where used it would be well to keep new ones on hand along with new porcelains to replace those which develop defects.

Reassembling.

The interior of the shell needs cleaning in the same manner. Some are difficult to clean, but a little practise will make a speedy job possible, though too much speed is not desirable if one looks for that quality in the car as a result of

tion, be sure not to loosen the retaining nut. If the laminations separate you never can get them together again and the plug will be useless.

VEHICULAR TUNNEL CONTRACT.

The contract between the states of New York and New Jersey for a vehicular tunnel under the Hudson river from Canal street, Manhattan, to 12th street, Jersey City, has been signed. The states agree that when the tunnel is finished a schedule of tolls will be established sufficient to repay each of the states within 20 years principal and interest of the entire amount advanced for construction. The cost will be \$12,000,000.

Edward S. Jordan, president of the Jordan Motor Car Co., says that the motor car industry is 1,000,000 cars short of the demand.

TIRE INDUSTRY AND TRADE

Heads Goodyear's Los Angeles Plant

Akron—A. F. Osterloh, secretary of the Goodyear Tire and Rubber Co., will go to Los Angeles this month to become vice president and general manager of the Goodyear Tire and Rubber Co. of California, which is capitalized at \$20,000,000. The California company will employ 7000 workers at the start and will have a capacity of 7500 tires a day.

Memphis, Tenn.—Ten tire dealers have organized the Memphis Tire Dealers' Association. Any employee who gives free air for a tire not purchased from a member of the association will be discharged. No road service will be given to autoists who do not buy their tires from the organized dealers. The association desires bills paid within 10 days and will take measures to collect amounts due more than 60 days. The dealers say it costs them \$1000 a day for their road service. Members of the association are: Four Sixteen Tire and Vulcanizing Co., Five Fifteen Tire and Vulcanizing Co., Five Fourteen Tire Vulcanizing Co., Four Sixteen Tire and Vulcanizing Co., Lee Tire Co., Newsum Tire and Vulcanizing Co., Quigley Tire and Rubber Co., Re-Nu Tire and Vulcanizing Co., Six Thirty-Eight Tire and Vulcanizing Co., Union Vulcanizing Co., Valley Tire and Vulcanizing Co., Vorder-Bruegge Auto Co.

Boston—An offering of 25,000 shares of the common stock of the Owen Tire Co., a Massachusetts corporation, engaged in the selling of automobile tires through a chain of 15 retail stores, is announced. With the proceeds of this sale of stock the company plans to open 10 new stores and a New York City jobbing house. The company is capitalized at \$125,000 of preferred stock, par \$50, and \$500,000 of common, par \$10. The stock will be traded on the New York and Boston curb markets.

Ft. Wayne, Ind.—R. H. Liedke, mechanical and efficiency engineer of Chicago, has arrived here to assume his new duties in connection with the Evans Tire and Refiner Co., whose plant is at 1807 Weissner Park avenue. He will be production manager.



A. F. Osterloh, Vice President-General Manager, Goodyear Tire and Rubber Co. of California.

Columbus, O.—Charles E. Ross, residing at the Southern Hotel here, is president of the Rainbow Tire and Rubber Co., which will erect a plant in Delaware. H. L. Gilbert is vice president, George E. Caylor is secretary and C. A. Morrison is treasurer, all three being of Columbus, O.—C. H. Pharis, for the last seven years connected with the automobile tire business here, has purchased the automobile accessory store of the Doremus Tire and Supply Co. at 119 East Gay street. In addition to a complete stock of automobile equipment he will handle United States and Kelly-Springfield tires. The store name will be changed to the United Auto Supply Co.

Boston—Changes have been made in the personnel of the Kelly-Springfield tire organization here. T. L. Lindsay, formerly branch manager in New York, is now district manager for New England and is likewise district manager for the New York territory. Howard B. Limric has been appointed special representative for New England and will make his headquarters at the Boston branch. E. A. McCoy, who has been in charge of the truck tire department here for the past year, now becomes branch manager.

Miller Rubber Co. Makes New Record

Akron—With an increase of approximately 56 per cent in sales volume for the first seven months in 1919, as compared with the same period in 1918, the Miller Rubber Co. shows every indication of shattering all of its previous records. Whereas the company did approximately \$16,000,000 business in 1918, a \$23,000,000 figure was set for 1919, and judging from present indications, the latter mark will be passed easily.

East Orange, N. J.—Ronald D. Downing, who eight years ago opened a small tire store on Broadway, near 58th street, New York, has opened his fourth store and is planning others. The new store is at 5 Washington street, East Orange. The three other stores are in Manhattan, New York City.

Kokomo, Ind.—The Kokomo Rubber Co. announces the appointment of Earl P. Logan as director of sales. Mr. Logan is one of the younger automobile tire sales executives who have come into notice rapidly with the expansion of the tire industry. His activities have been in the South and Middle West. He was originally a banker.

Boston—Robert C. Freeman has been promoted to manager of Goodrich truck tire sales for New England, succeeding Hayes C. Krimmel, who will do special work in the Chicago territory.

Wilmington, Del.—The Avon Tire and Rubber Co. has been chartered in Delaware with \$1,000,000 capitalization by M. I. Blossoms, Benjamin Lowenstein and John W. Covell, all of Cincinnati.

Hartford, Conn.—The Holcomb Tire Service Co. of Hartford has been formed with a capital of \$3000, divided into 120 shares, for which Albert Wurts and Lucy C. Pausmentier have subscribed each for 40 shares.

Providence, R. I.—The Kokomo Tire Co. has been incorporated to do business here. The capitalization is \$100,000. Maurice Robinson and Charles M. Robinson, 685 Eddy street and David C. Adelman, 204 Saratoga street, are the interested parties.

STEPHENS RUBBER CO. TO MAKE TIRES AND TUBES.

The A. J. Stephens Rubber Co., Kansas City, has increased its capitalization to \$1,500,000 for the purpose of engaging in the manufacture of tires and tubes. The company has had rapid growth in the manufacture of tire accessories and fabric products. Mr. Stephens says that about six months will be required for the complete installation of tire making equipment, as equipment adapted for tire making already in the plant cannot be diverted from its present uses. The company's production of blow out patches has reached 3,000,000 patches annually, and the company has recently developed an annual output of 2,000,000 fan belts. The expansion into tire and tube making will increase the number of employees from 200 to between 500 and 600. The present plant is amply large for the new departments, having over 100,000 square feet of floor space. The company began in 1916 with six employees. Mr. Stephens, prior to that time, had been jobbing tires and accessories. The young plant outgrew two Kansas City factories in rapid succession. The company now has a national distribution of its products, as well as foreign representatives. A. J. Stephens, founder of the business, becomes president and general manager of the enlarged corporation.

SPICER ACQUIRES PARISH AND SHELDON COMPANIES.

The Spicer Manufacturing Corporation, a Virginia company, which is the largest manufacturer of universal joints and shafts for automobiles in the United States, has purchased the Parish Manufacturing Corporation and the Sheldon Axle and Spring Co. The Parish company, which has plants at Reading, Pa., and Detroit, Mich., is one of the largest manufacturers of frames for automobiles and trucks in the country and the Sheldon Axle and Spring Co. is the second largest manufacturer of axles. The acquisition of these two properties makes the Spicer corporation one of the most important factors in the automobile industry.

NEVILLE NAMED SALES MANAGER FOR HINKLEY MOTORS.

The appointment of Charles A. Neville as sales manager of the Hinkley Motors Corporation is announced by President C. C. Hinkley. Mr. Neville joined the Hinkley staff soon after the organization of the company. His promotion is the result of successful result getting effort in the sales department, of which he has now become the head.

NEW COLUMBIA ROADSTER.

The new Columbia roadster will have five Disteel wheels as standard equipment. The extra wheel is carried at the rear of the car in a counter-sunk space in the deck, which gives the car unbroken lines from front to rear.

Coghlan Heads Sales of Piston Ring Company

THE American Hammered Piston Ring Co., Baltimore, announces the appointment of Walter P. Coghlan as general sales manager. He has been prominently identified with the Klaxon Co., Newark, for the last five years as secretary and sales manager. "We are highly pleased to announce Mr. Coghlan's appointment," said C. F. Hockley,



Walter P. Coghlan.

general manager of the American Piston Ring Co., "for we consider that Mr. Coghlan not only has an enviable merchandising record, but has a remarkably wide acquaintance among automotive equipment jobbers and dealers in all parts of the country and has been in close touch with them and their problems for a number of years."

Mr. Coghlan originated the "Danger-Sound Klaxon" idea, which was later developed into prominence and importance in road signs posted by clubs, good roads associations, etc., along the lanes of tourist travel in many states.

The American Hammered Piston Ring Co., with which Mr. Coghlan will become actively associated on Nov. 1, has held a position of prominence with motor car manufacturers for several years, its rings having been used as standard equipment in such high class cars as the Pierce-Arrow, Winton, White, Stutz, Mercer and others, as well as in some of the best known trucks and tractors, and during the war in the Hispana-Suiza airplane motors.

The company was originally a Newark concern, but the entire capital stock was purchased early this year by the Bartlett Hayward Co., Baltimore, Md., which has been a large producer of high grade products for industrial purposes for a great many years. The Bartlett Hayward Co. won an enviable reputation in filling con-

tracts amounting to many millions of dollars for the Allies before America entered the war and after that for our own government. The excellent organization developed for this work, together with the equipment installed, is now available for the manufacture of American hammered piston rings by the American Hammered Piston Ring Co.

Mr. Coghlan's success in the accessory sales field has been rapid. He joined the Klaxon Co. in 1914 as northwestern representative and a year later became sales manager. A few days after the United States entered the war he enlisted in the navy, and was honorably discharged in December, 1917, because of a former hip injury. He resumed his former capacity with Klaxon. Throughout the remainder of the war he kept the good will of the company's distributors, although the factory's output was diverted to government use. His excellent work was rewarded by orders that poured in after the armistice was signed, and two months later the company found itself more than 100,000 instruments behind in its orders and even with increased production it is still oversold today.

DYER ISSUES PISTON DIRECTORY.

The G. H. Dyer Co., Cambridge, Mass., has issued a piston directory, which gives prices on pistons finished and semi-finished, standard and oversize, wristpins and rings for 50 makes of passenger cars and 130 trucks. The company announces that this is the first price list or catalogue of its kind ever published in this country, as far as it has been able to learn. The demand for oversize pistons is growing rapidly, as the car owners and repair men have become educated to the fact that new pistons are the only positive cure for such complaints as carbon troubles, oil throwing and piston slap. New pistons properly fitted to re-ground cylinders or lapped into old cylinders make the operation of the motor and its power satisfactory. The Dyer company is now selling large numbers of these pistons and has started to market them through the jobber.

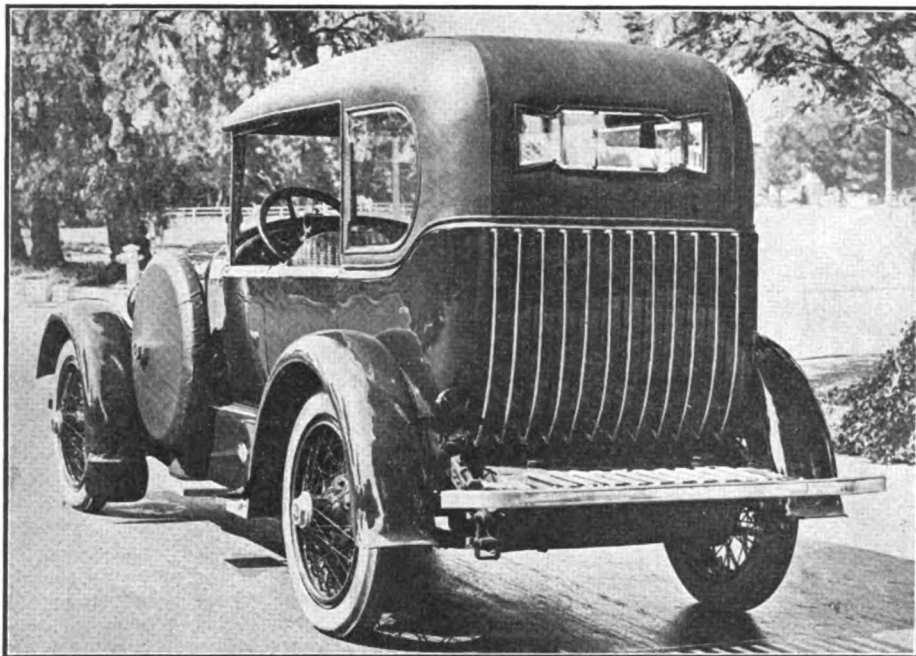
"PRONTO" FIRE EXTINGUISHER.

C. Louis Allen, who was formerly president of the Pyrene Manufacturing Co., has given the name "Pronto" to the fire extinguisher which he recently developed and is now manufacturing through the Allen Corporation, of which he is president. The "Pronto" sells for \$1.50 each, six for \$8.50. The home office of the company is at 546 Greenwich street, New York.

ROYALTY IN CADILLACS.

When the King, Queen and Crown Prince of Belgium visited Boston 30 open and enclosed Cadillac cars were used for their party. These cars were furnished by the Cadillac Automobile Co. of Boston. Harold D. Bornstein and Martin P. Vahey had charge of the automobile arrangements.

Leach-Biltwell Six-Cylinder Passenger Car



Three-Quarter Rear View of the New Six-Cylinder Passenger Car Manufactured by the Leach-Biltwell Motor Co., Los Angeles.

A SIX-CYLINDER passenger car, with a seven-passenger sport carriage or a four-passenger speed body, with numerous little innovations to carry out the claim for a new conception of elegance, style, convenience and comfort, is announced by President M. A. Leach of the Leach-Biltwell Motor Co., Los Angeles.

Because huge sums of money are expended annually in the far west by automobile owners in transforming their motor cars so that they will appeal to individual tastes, the Leach Power Plus Six comes before the public with a deluxe top, unique upholstery and an unusual amount of paint carefully applied, taking 24 operations. It is, according to its manufacturers, a sturdy, speedy, dependable automobile mechanically, with advanced style and comforts.

Initial Production.

The company is incorporated for \$1,000,000 and has manufacturing facilities and materials purchased for 1000 production during the coming year. The company have also started the building of a new plant to take care of increased production. M. A. Leach, president of the company, is well known in the industry among manufacturers and western dealers and has had a peculiar training fitting him to head a company that will build a car of the deluxe type. He has worked for factories as their paid representative and he has merchandised automobiles as a distributor in Los Angeles and San Francisco. Previous to his automobile training he made a mark as a big operator in the western lumber fields of Mexico.

In mechanical construction the car's power plant will be the model 9N Continental Red Seal motor, 3½-inch bore and 5¼-inch stroke. The manufacturers claim speeds of from 1½ miles to 60 miles per hour. The crankshaft bearings,

three in number, are exceedingly large of white metal, bronze backed; gray iron pistons of unusual lightness carefully balanced to work in accordance with the wonderful balanced crankshaft. Each piston has three rings in the top and is fastened to the connecting rod with a hardened wristpin at one side. The wristpin moves in a hardened and ground bronze bushing in the connecting rod. The lower bearing of the connecting rod is of white metal and being of the split type is easily adjusted to take up wear. The crankshaft is 2¾ inches in diameter, has the correct balances forged integrally with the shaft proper instead of attaching counter weights as has often been employed. This is the newest feature of the new Continental motor.

The radiator is of a special design shell



M. A. LEACH.
Head of Leach-Biltwell Motor Co.

and has a core four inches thick. It was designed particularly for assuring the utmost radiation in desert and mountain use. It works in conjunction with an engine operating pump. The radiator is from the plant of the Flexo Radiator Co., Los Angeles. The axles are the same that have helped maintain the wonderful reputation of several high grade passenger cars and are built of best material obtainable and under proper engineering auspices.

Uses Delco System.

The transmission is Brown-Lipe and the starting, lighting and ignition system is the Delco. The frame is eight inches, the springs semi-elliptic in front and three-quarter elliptic in rear, the brakes powerful enough to stop the car in any emergency, yet only the slightest effort is necessary to apply their full power. The car has an ingenious system of equalizers which, it is claimed, will eliminate the necessity for continual brake adjustments. The foot brake is external, contracting on the drum bolted to the rear wheel; the emergency brake is internal expanding of the cam type, also operating on the rear wheel. The clutch is a Brown-Lipe disc. The wheelbase is 126 inches, the tires 32x4½ cords, the wheels disc and the lamps large size Duplex. The battery is a Hobbs made at Los Angeles.

Side curtains that slide up or down are a feature of this car that makes the vehicle either an open or closed car. The use of buttons, fasteners and snaps has been entirely eliminated. The curtains just slide, there being no cords to break or springs to snap. The curtains lay flat in the top, protecting the composition glass from becoming scratched or cracked. There are no rattles, because there is nothing to rattle. It only takes a slight pull to operate the curtains and they are always ready for instant use. They can be placed out of sight, or used to entirely close the car or partially close it. The top itself, rakish and of a pleasing design, is a patented exclusive feature.

The windshield, a one-piece with clear vision, is built as a part of the top. It is constructed in sections so if any part should break it is easily replaced. The top, body and fenders are hand made. The car has a patented combination trunk rack and bumper in the rear. It is ornamental as well as a necessity for the tourist.

In building the car the manufacturers had design for style prominently before them, the comforts of the passengers in seating arrangements, all the power that one could possibly use even in California, ease of riding and the creation of design that gives attention to details. At present the price of the car is \$3750 f. o. b. Los Angeles. Colors are optional. The price for the car finished in velour is \$3950.

There is every reason to expect that there will be a big demand for the Leach-Biltwell car, not only on the western coast, but also in other parts of the country.

EXPERIMENT WITH NEW CHEMICAL FUEL FOR AUTOMOBILES.

A cablegram from London states that interest has been aroused in Nottingham by the experiments which are being carried out by Alderman Ball as to the value of a new chemical fuel for driving motor cars. Alderman Ball told an interviewer that he was negotiating with an American inventor now in England for putting it on the market. So far as he had experimented with it, he said, the mixture was all that was claimed for it as a fuel, and he had driven 30 miles on a gallon at a very cheap rate. If the inventor's claims were justified by further experiments, he said, he believed the fuel would revolutionize the motor transport industry.

What the substance is the inventor and testers are keeping a secret, and beyond saying that a pint of water is put into the tank to start the engine after the mixture has been introduced, Alderman Ball will reveal no details.

"I am not building up too great hopes at this early stage," he said.

It is asserted that for fivepence a distance of 30 miles can be covered, and that the substance will keep for any length of time when stored.

HIGHLAND BODY OPENS BRANCH IN DETROIT.

The Highland Body Manufacturing Co. of Cincinnati, O., has opened for the convenience of truck manufacturers in Detroit, a branch in that city in charge of P. H. Willis. The Detroit branch includes a large warehouse where both Highland Standard bodies and cabs and a stock of "Everyday" farm bodies will be carried subject to the order of local truck companies.

PLAN LOW PRICED CAR.

Automobiles, cotton pickers and cotton compresses will be manufactured in Charlotte, N. C., by the National Cotton Picker Corporation, chartered with \$1,000,000 capitalization. The automobiles will range in price from \$300 to \$500.

Gill Branch Managers are Optimistic at Convention

The Gill Manufacturing Co. recently held a convention of its branch managers in Chicago. The company has branches in practically all important cities from coast to coast, and more than 50 of its representatives attended. The surprisingly successful sales season just passed naturally resulted in a very enthusiastic gathering. These Gill men seem to have developed the "winning streak" as a result of live business methods and enthusiastic sales work.

The men inspected the ground which has just been broken for the new Gill factory to be built in Chicago, it having been found necessary to have a greatly increased factory space to take care of the demand for Gill piston rings, also the new Gill Aera carburetor, which—the company will place on the market immediately.

This carburetor is of the constant vacuum type, absolutely automatic and will be somewhat of an innovation on the carburetor market. Success for the new carburetor is bespoken by the live representative selling organization which will be back of it.

The accompanying photograph shows a group of Gill branch managers and officials.

MCCORD ISSUES GASKET CATALOG.

The McCord Manufacturing Co., Detroit, has published a catalog completely describing and giving the specifications for all the various copper-asbestos gaskets which it manufactures. Included are spark plug gaskets, exhaust and flange type gaskets, exhaust manifold gaskets, cylinder head gaskets for passenger cars, cylinder head gaskets for trucks, valve plate gaskets and Ford gaskets. An assortment of shim stock is also shown, as well as miscellaneous gaskets of open and closed types.

Those interested in gaskets should write for a copy of this catalogue.

BRITONS WANT OUR CARS; RESTRICTIONS REMOVED.

Premier Lloyd George's announcement of the suspension of Board of Trade licensing restrictions on the importation of American automobiles was the result of an increasing preference on the part of English motorists for American cars quite as much as the urgency of increased motor transport to supplement other means of conveyance.

Formerly in England there was considerable prejudice against American-made cars. This prejudice is now ascribed either to ignorance of their true worth or to snobbery. One contributor to a British motor trade journal declares:

"Quite honestly, there is no better value for money in the motor world than the average American car. The point at the moment, however, is not exactly one of sheer value, but whether, in our own best interests in the long run, we should admit the vehicles freely, ration their import, or bar them altogether.

"At the present time there is a desperate shortage of motors in this country. Our own manufacturers, owing chiefly to circumstances over which they have no control, are unable to meet the demand, and so, to some extent, we benefit immediately by importing motor vehicles from the United States.

"At the same time, the fact remains that the American factories cannot, for a considerable time, meet even their own demands, yet they are willing to keep their own market short in their attempt to consolidate and increase their foreign markets. There is ample food for thought in this fact."

When questioned by a deputation of British automobile manufacturers on Sept. 22, Sir Auckland Geddes, minister for National Service and Reconstruction, gave them no hope that a tariff would be imposed on American motor cars.

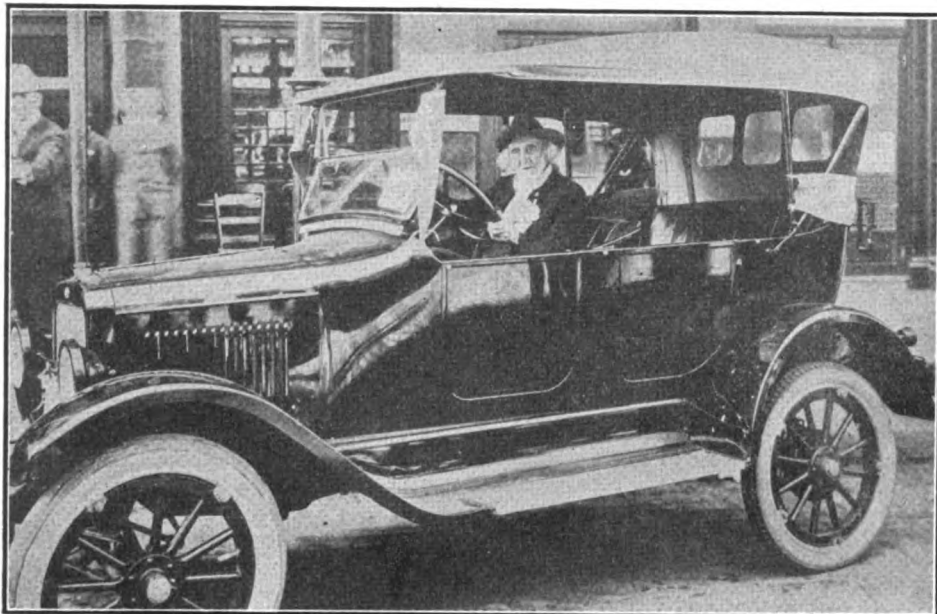
NEW YORK REGISTRATION PLATES.

Registration plates for New York automobiles next year will be a pea green color with black numerals. An order has been placed for 600,000 sets of plates.



Branch Managers of the Gill Manufacturing Co., Who Met at Convention Held in Chicago Recently.

Oldest Man in the World Enjoys Ride in Auto and Aeroplane



John Shell, Lexington, Ky., 131 Years Old, Driving Overland 4.

JOHN SHELL, of Lexington, Ky., 131 years old, said to be the oldest man in the world, was one of the features at the Kentucky State Fair at Louisville this month. His daughter, 97 years old, watched him with almost motherly care. He had a ride in an aeroplane and liked it at an altitude of 600 feet. After that he had a ride in an Overland 4, the new light weight car which the Willys-Over-

land company is putting on the market this season.

"I have ridden in a lot of automobiles," this man who has lived in three centuries said, after his ride in Overland 4, "but I do not think I have ever been in an easier riding car."

The picture shows Mr. Shell at the wheel of an Overland 4.

FORDSON TRACTORS TO BE SOLD DIRECT TO DEALER.

Fordson tractors will be sold direct to the dealer after Aug. 1, 1920, when the present plan of handling them through authorized distributors will be discontinued. The change conforms to the policy of some tractor makers in eliminating the distributors in favor of the branch house plan of distribution. It is expected that selling costs will be reduced. When Henry Ford & Son began the sale of the Fordson last year Ford car dealers were in most instances given preference when distributors were appointed. However, some organizations that did not deal in cars were given rich territory.

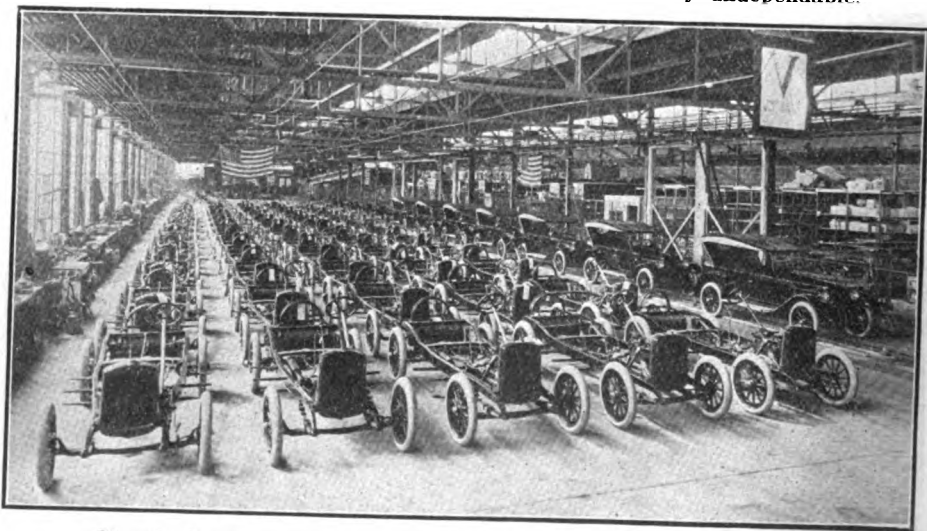
GRANT MOTOR CAR CORPORATION SPEEDS UP PRODUCTION.

"Speed up production" is the standing order of the day in the big plant of the Grant Motor Car Corporation, Cleveland, O. There must be 20,000 Grant Light Sixes of the present series produced if even present demands are to be met. As rapidly as the chassis are assembled they are put through their final tests. Then they are returned to the main floor of the plant for bodies.

In the accompanying illustration is shown a day's output at the Grant plant. In the foreground and extending to the

end of the picture in the rear are the chassis ready for bodies. On the right of the picture and astride the endless chain conveyor system are completed cars ready for final inspection when they will be shipped or driven to the 1600 dealers making up the Grant sales and service organization.

The corporation announces that J. A. Haskell, formerly of Chicago and Des Moines, who has been connected with the sales department, has been appointed assistant general sales manager.



Chassis Ready for Bodies in Plant of Grant Motor Car Corporation.

Motorists Are Robbed At Many "Gas" Pumps In New York State

Survey Shows Nearly Half of Measuring Devices for Gasoline to Be Inaccurate.

SHORT MEASURE delivered by gasoline measuring pumps causes a considerable loss daily to thousands of automobilists in New York State, according to a report made public by Commissioner Eugene H. Porter, of the Division of Foods and Markets, at Albany, following a Statewide survey carried on by the Bureau of Weights and Measures in conjunction with city and county sealers. Out of 1,100 gasoline measuring devices tested, 535 indicated shortages ranging from one-half pint to one quart on a five gallon delivery, and in a few instances sealers found shortages running from two quarts to as high as two gallons.

Machinery Unreliable.

In a large majority of short deliveries there was no apparent intent on the part of pump owners to defraud, the report says. Rather the shortage is ascribed to carelessness or unreliable machinery. Carelessness may be evidenced in various ways, but interest in the transaction on the part of the motorist will do much to establish better and more uniform service. To insure himself against shortage, the motorist should watch the operator to see that he makes a full stroke when operating the pump. If the machine bears an indicator showing the quantity as delivered, this also should be closely observed. The delivery hose should in all cases be drained since it is likely to contain from one to two quarts of the gasoline.

Responsibility rests with the pump owner for maintaining his machine in a state of accuracy. In many cases a pump may be inspected by a weights and measures official and found to be operating correctly, but upon his return within a month it may show a shortage and prove to be wholly undependable.

Three Attractive Closed Models Announced by Chandler Co.

Seven-Passenger Sedan, Four-Passenger Coupe and Limousine Are New Offerings for the 1920 Season.

THREE attractive and sturdily built closed models, the limousine, seven-passenger sedan and four-passenger coupe, are offered by the Chandler Motor Car Co. of Cleveland in the new series. All models are built on the Chandler standard chassis with the six-cylinder $3\frac{1}{2} \times 5$ motor, which has maintained for the Chandler a reputation for efficiency and reserve power for six years. Closed models are all luxuriously and comfortably fitted and have many conveniences exclusive with this line.

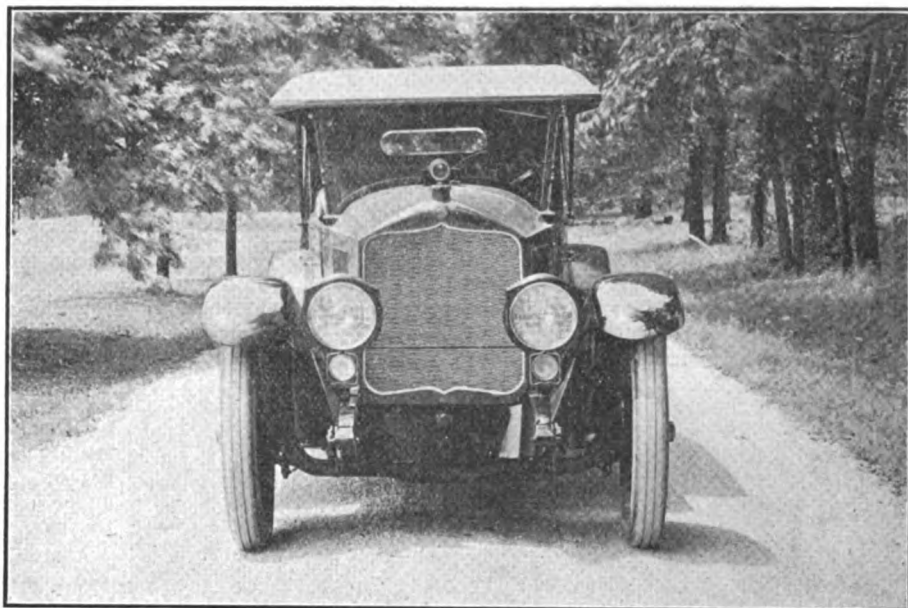
The new series limousine is exceptionally well appointed and finished. Its interior has mahogany paneling and auto-phone and mahogany smoking and toilet cases. Lights include dome, reading and automatic step lights. Nickered coat hooks are also provided. A striking feature of the exterior is a bevel ledge along the outside of the windows, which adds to the general symmetry and artistic features of the limousine.

The Chandler sedan has undivided front seat, extending solidly from side to side, and the doors are large, offering easy access to either front or rear. Auxiliary seats are wide, deep and have spring cushion seats. The coupe has a driver's seat forward of the wide rear seat. An auxiliary seat with spring cushions may be placed alongside the driver or folded away when not needed.

All Chandler closed cars are entirely metal, covered with square cornered doors and windows. The lower windshield panel curves to follow the high, rounded cowl. Windows are of heavy plate glass, adjusted by an automatic lift. Fine silk plush covers all upholstery and all metal fittings are of colonial type with dull silver finish.

Features of the Chandler sedan and coupe that are entirely new are seen in the high hood and radiator; the lower windshield panel curving to follow the

Improved Overhead Valve Engine in New National Sextet



Distinctive Front Lamps Add to Charm of the New National Sextet.

A NEW model christened the National Sextet, is announced by the National Motor Car and Vehicle Corporation, and is being progressively introduced to the public in various parts of the United States as rapidly

as demonstrators can be manufactured.

The new car is a six with an improved overhead valve engine that has been in process of development for the last two years. In its present perfected state it has a power output and performance out of all proportion to its size.

The bore and stroke of the engine is only $3\frac{1}{2} \times 5\frac{1}{4}$ inches, yet it develops 71 horsepower at 2600 revolutions per minute, showing the remarkable gain of 57.8 per cent. over the previous six built by the National company of the same size.

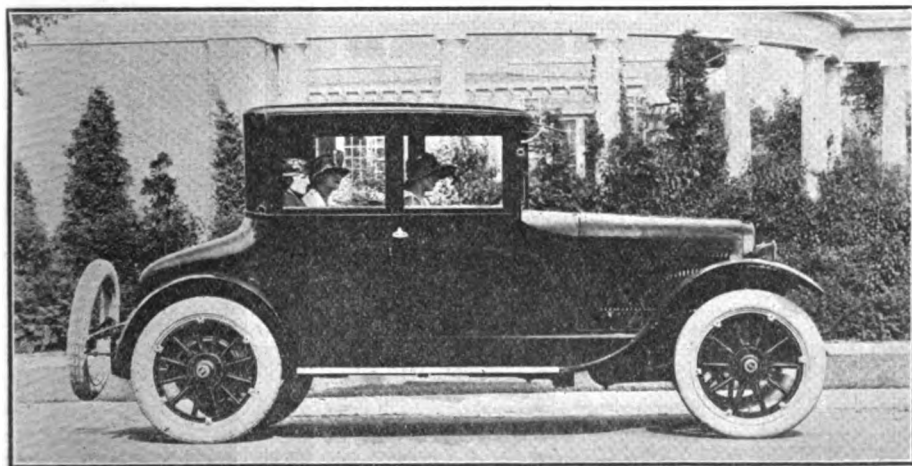
Reasons for this remarkable increase are to be found in advanced design, and extremely fine and close workmanship, utilizing to the utmost every ounce of fuel and reducing waste of energy, either through friction, inertia of moving parts, or binding action due to vibration, to a minimum.

Above all, the engine is characterized by an ability to resist wear and to survive the hardest runs without injury. Selection of the finest materials and the use of greatly oversize parts at every point of wearing contact are responsible for this feature.

The crankshaft of the engine is especially noteworthy in this respect, being tremendously strong and thick, with bearings $2\frac{1}{2}$ inches in diameter, as compared with the cylinder bore of only $3\frac{1}{2}$ inches. Wear on bearings of this size is very slow as has been proved in actual practise.

Distinctive front lamps, with integral auxiliary lamps underneath for city driving, give the head-on view an extra touch of charm in harmony with the time honored and familiar design of the National's radiator.

The prices are: Seven-passenger touring, \$3290; four-passenger phaeton, \$3290; two-passenger roadster, \$3290; four-passenger coupe, \$4200; seven-passenger sedan, \$4250.

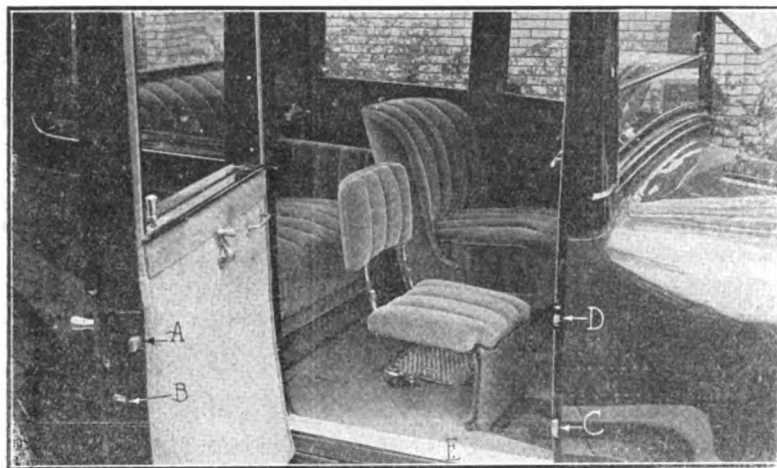


An Attractive New Chandler Model, the Four-Passenger Coupe.

How To Take Rattles And Squeaks Out Of The Motor Car

Practical Suggestions for Eliminating All Unnecessary Noises. How to Find Them and Proper Methods of Making Adjustments. Must Make Chassis, Body and Component Parts Wholly Tight.

THERE are a number of points common to all passenger cars which are bound to rattle or squeak after the car has been in use for a time. The proper method of approach is to consider



A, B, C, D, E—Points at Which Squeaks May Occur in Doors of the Closed Car Type. These Points Should Be Watched and if Squeaks Occur, a Few Drops of Oil Will Often Correct Them, or Supplying a Thin Section of Rubber or Wool Felt to Act as a Bumper for the Door to Strike Against Will Usually Eliminate Them.

each point separately and go over the car carefully, with the idea of making the chassis, body and its component parts as tight as possible. After this have a helper ride on the running board and while you operate the car have him listen to locate the squeaks and rattles. As soon as they are located stop the car and apply oil to the squeaks and tighten the rattles.

A hint as to what points to look for first and what to go over as a rule on all cars may be of value. Taking the chassis first, as most of the rattles that are not readily apparent come from the chassis, the man who is working on his car can go from the front to the rear. Starting with the head lamps, the brackets which hold these in place should be thoroughly tested and note made if they are rigid. If they are not, they are bound to be rattle producers. The rattles resulting from loose parts of this kind make themselves felt at definite speeds, giving rise to what is known as the periodic rattle. Some of these rattles occur perhaps at 25 miles per hour and disappear at 28, and are not apparent either above or below this small range.

After tightening the lamp brackets, go back to the radiator and see that the bolts which hold the radiator in place are tight. Very often these will loosen after a season's driving and give rise to a pounding knock every time the car goes

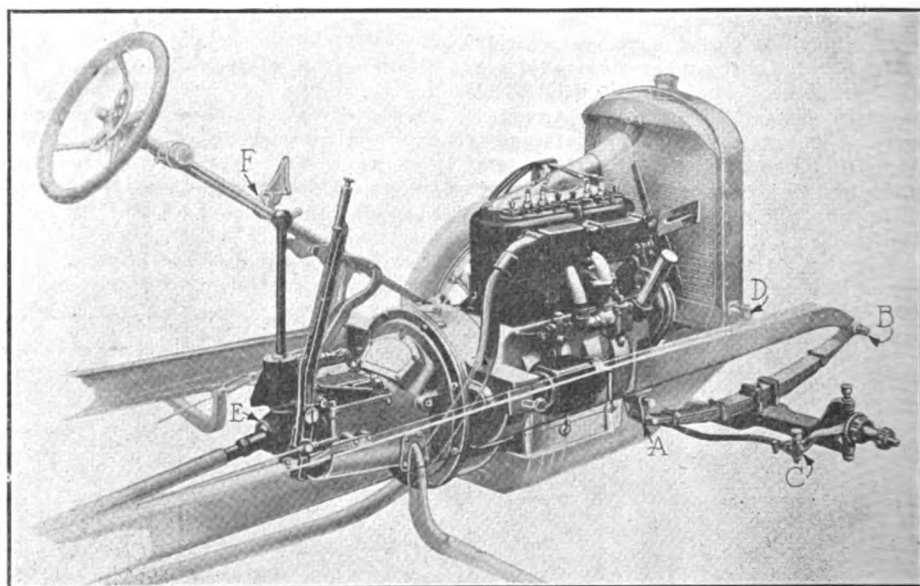
over a cobble stone pavement or some place where the motion of the front end of the car is sufficient to throw the radiator up in the air and let it drop back again. Even if this is only a few thousandths of an inch, it becomes readily apparent to anyone in the car.

A similar pounding action results from loose engine bolts—the bolts that fasten the engine to the frame or sub-frame. These should be tightened and either lock wash-

the steering connection should be closely examined and if worn they should be re-bushed. Working back along the units of the chassis the universal joints should be carefully inspected and if they are worn or have too much play they should be either replaced or very thoroughly packed in wood fiber grease to reduce the noise. There is no repair possible on universal joints as a rule and it is very seldom that they wear out unless they have been grossly neglected.

The muffler supports are liable to become loose and allow the muffler to rattle while passing over rough roads. These should be rebolted tightly and it will prove surprising how many times this will stop the rattle which seems almost impossible to find. In connection with the muffler the bolts on the exhaust pipe should be tightened so that this is not free to rattle.

If the car is supplied with a torque tube or radius rod, be sure that they are tight. These are prolific rattle producers, and unless everything is tight about them they are sure to cause noise. Another place that is almost certain to bring noise if the car has been driven



A, B—Spring Shackle Grease Cups; Keep Filled with Cup Grease and Turn Down Often. C—Tie Rod Forked End; Keep Tight and the Cup Filled and Turn Down Often to Supply Sufficient Lubrication. D—Radiator Bolt; Keep Tight to Avoid Rattle. E—Universal Joint Rear of Transmission; Supply Sufficient Lubrication if Cup Is Provided, If Not by Means of the Transmission, Keeping the Transmission up to Proper Height. F—Steering Post Bracket at the Dash; Keep Screws Tight in Dash, Otherwise Noise Will Develop.

ers put on or lock nuts, or perhaps castellated nuts and cotter pins.

The steering gear will develop rattles if wear has gone too far. The joints in

any length of time is among the spring shackle bolts. Wear is certain to come here, because all of the road shocks are transmitted through them. The remedy

is rebushing and a renewal of the spring bolts if no means of adjustment is provided at the shackle. On some of the newer cars provision is made to take up wear at this point by means of an adjusting nut.

Other points where rattles occur are at the fenders, and tightening the fender bolts usually eliminates the noise. Light fenders will occasionally spring, especially at the apron adjoining the fenders along the running board, and will have to be strengthened by fitting a strip of iron across the break and bolting with small bolts.

Body Squeaks.

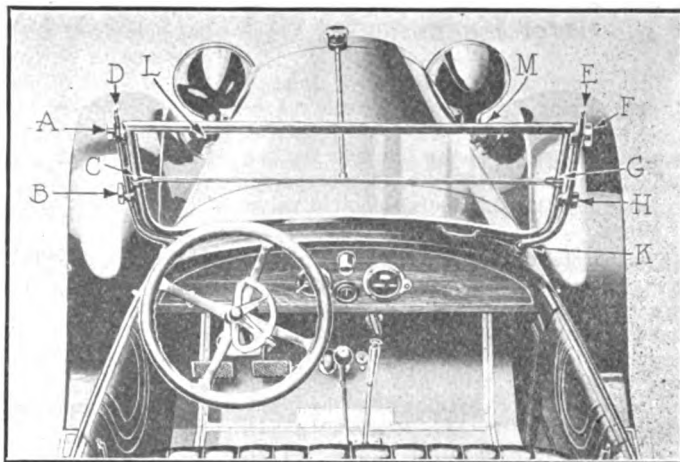
Squeaks about the body are annoying and many times are caused by parts of the wood of the body rubbing together. Where the body rests on the frame the manufacturer usually places small pieces of leather to keep the sill of the body from rubbing on the metal of the chassis frame. In time these leathers dry out and squeaks will occur, or the body bolts will become loose, allowing the sill of the body to rub on the leather and squeak. Such squeaks are easily cured by applying oil to the leather and tightening down the body bolts from underneath the car.

Door squeaks are common, especially in cars having an enclosed body. While very annoying, they may be stopped by locating the points where the rubbing occurs and applying oil or installing one of the anti-rattler springs that may be purchased at any supply house. These springs are similar to those used by carpenters in fitting sliding screens to a window and are fastened only at one end, allowing them to depress when the door is closed.

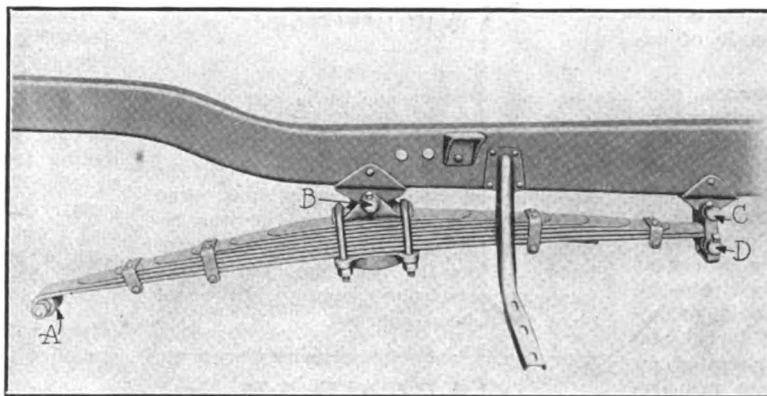
Windshield squeaks, while harder to locate, are usually caused by looseness. The best method of finding them is to try the various nuts of the shield until those that are loose are found. Tightening these will

usually do away with squeaks at this point. Oil may help in some cases such as at the joints of the shield. The squeak is noticed as the shield is opened or closed.

Fender rattles and squeaks, while not so difficult to locate, may cause trouble for the novice as it is possible for them to occur at one of many points. Fender brackets are usually a source of trouble as the nuts holding them to the frame have a tendency to work loose, due to vibration, and if they are not tightened frequently the fenders will rattle. Other points where rattles occur are the under side of the fenders where the brackets fasten to the fenders. These



A, B, F, H—Points at the Hinges of the Windshield at Which Squeaks or Rattles May Occur; Keep the Joints Tight and Well Oiled. D, E—Ball Tops at the Top of the Shield to Which the Top Fastenings; Rattles May Occur Here Through the Fastening Nuts Becoming Loose; See That These Nuts Are Tight. C, G—Where Upper and Lower Sections of the Shield Adjoin; the Glass May Fit Poorly and the Sections of the Shield Chafe, Due to the Screws at the Ends of the Sections Fastening the Glass in the Frame Becoming Loose; Examine These Occasionally to Note if They Are Tight. L, M—Headlights; Examine These Closely for Rattles at Points Where They Fasten to the Car Frame; Rattles Will Occur Due to Vibration and Are Sometimes Hard to Detect; Try All Fastenings with a Wrench to See if They Are Tight; Reflectors in the Lamps Will Work Loose at Times; Jar the Lamp with the Hand to Note This. K—Windshield Side Rod Passing Into the Cowl; This Nut Sometimes Loosens, Causing a Rattle or Squeak; Tighten the Nut Under the Cowl.



A—Spring End Fastening to the Rear Axle; Through Wear This Joint Becomes Loose, Causing a Rattle, or the Lubricant Becomes Dry or Exhausted; Tighten Bolt or Supply a New One and Lubricate. B—Center Spring Hanger and Bolt Fastening the Spring to the Frame; Tighten the Nut if Loose and Supply Lubrication Often. C, D—Front Spring Shackle Fastening the Front End of the Spring to the Frame; Lubricate Often and Tighten the Nuts When the Shackle Becomes Loose. Rattles and Squeaks Occur Here Very Frequently.

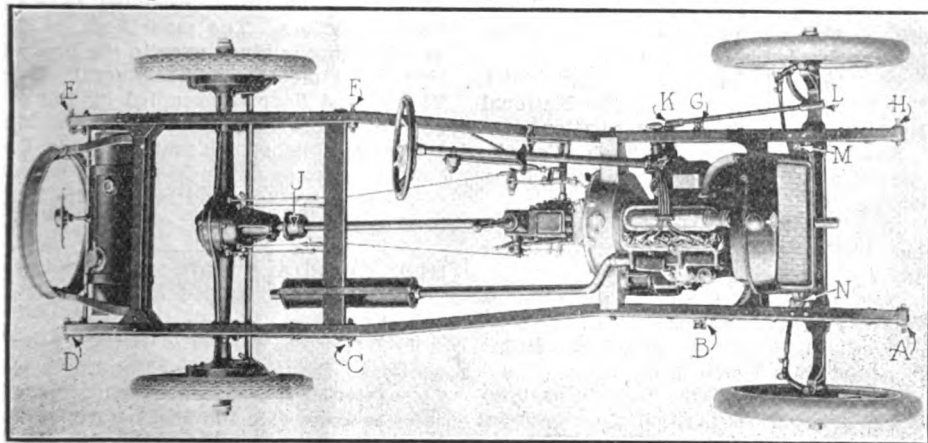
are fastened by rivets and at times will work loose, allowing the fender to work. Tighten the rivets by holding a block of iron on the head of the rivet and heading over the end of the rivet with the peen end of a hammer.

The apron, extending along the side of the car between the running board and the body of the car, will at times vibrate if the metal is quite thin. This apron is fastened only at the ends, resting upon the running board brackets. Some car manufacturers fasten this apron to the brackets by small clamps that are riveted through the apron, so that they rarely rattle, but

other manufacturers do not follow this practise and rattles occur. Some method of fastening should be employed or the space between the apron and the bracket packed with a filler. Paper or wood may be used.

Spring squeaks are best eliminated by jacking up the car body, letting the wheel and axle hang free. This will allow the spring leaves to open. The operator may then insert graphite and oil between them with a hack saw blade, or graphite and hot paraffin may be used instead. Treat all four springs alike, making sure that the lubricating material is placed well in on the spring leaf.

Covers may be purchased from the accessory supply houses that will protect the springs from oil and dust. They are provided with wool felt lining, soaked with oil, that keep the spring leaves lubricated.



A, B, C, D, E, F, G, H—Spring Shackles and Bolts Will Squeak if Not Properly Lubricated and Will Rattle if Loose. K, L—Steering Tie Rod Will Rattle if Loose and Squeak if Dry. M, N—Radiator Bolts Will Cause Disagreeable Rattle if Loose; Keep Bolts Tight. J—Universal Joint, Keep Well Lubricated and the Cover Tight to Avoid Unnecessary Noise.

BLACK & DECKER EXHIBIT AT SHOW OF JOBBERS.

The exhibit of the Black & Decker Manufacturing Co. at the November Jobbers' Convention in Chicago will consist of a complete line of the Black & Decker electroflater electric air compressors, portable electric drills and electric valve grinders.

The outstanding characteristics of the electric air compressors is their unit construction, the motor gearing and compressor being built into one housing. The portable electric drills and electric valve grinder are unusually attractive in appearance and are distinguished by "The Pistol Grip and Trigger Switch," a patented method of control similar to an automatic pistol.

The display racks on which the Black & Decker valve grinders and drills will be shown are the same as are being given to the company's stock jobbers for displaying these goods effectively in their stores. They are quite elaborate metal racks, nearly six feet high, and hold one electric valve grinder and four different size electric drills. They are black enamel and at the top of each is an enamel sign bearing the company's name and arranged with holders for circulars. The supplying of these racks in large numbers to company's stock jobbers throughout the country and in fact, all over the world, is an interesting example of advanced merchandising.

Actual electric air compressors, electric drills and electric valve grinders, cut out to show their construction and operation, will be attractively mounted on hexagonal display boards (the company's trademark being hexagonal in shape) and the various cut out models will operate under their own power at slow speeds in order to demonstrate the actual functioning of each part. Complete sets of parts for the different machines will be shown also mounted on hexagonal boards. Elaborate preparations have been made for next year's campaign, the details of which will be disclosed at the shows by those in charge. For this purpose elaborate portfolios have been prepared showing the products and going into some detail in regard to their merchandising, showing the type of advertising which the company has been doing and the various sales helps which they have prepared for their jobbers.

It is hoped to make the exhibit unusually attractive, interesting and instructive and it will doubtless create considerable favorable comment, as it is more than an aggregation of products miscellaneously displayed.

NEW FEES IN NEW YORK STATE HARD TO COMPUTE.

A new law increasing registration fees on passenger cars goes into effect in New York state Feb. 1, 1920. This law will add approximately \$2,000,000 to the cost of operating motor cars there annually. The secretary of state's office is having difficulty in working out some basis upon which these taxes may be imposed. In

computing the fee the age of the car, the list price and the horsepower of the engine are to be considered. Undoubtedly this method of arriving at the fee to be paid by the car owner will result in confusion and complication.

OHIO TRAILER CHANGES NAME; TO MAKE PASSENGER CAR.

A high class, six-cylinder passenger car is to be built by the Ohio Trailer Co. Announcement is made that the company has already placed contracts with the leading automotive material manufacturers on a basis of 1000 cars to be built the first eight months of 1920 and that a definite production schedule will be well under way on or before the first of the year.

At a special meeting of the stockholders of the company, held in Cleveland, Oct. 1, it was unanimously decided to change the name of the company to the Ohio Motor Vehicle Co. and to increase the authorized capital from \$300,000 to \$1,000,000. Under the same management and directorate responsible for the success of the Ohio Trailer Co., the new company will continue the production of Ohio trailers, in addition to producing the passenger car.

MOTOR 'BUSES REPLACE RAILWAY CARS IN NEW YORK.

Mayor Hylan appears to be determined that motor 'buses are to be run in competition with the railway cars in New York city. When the storage battery cars which formerly ran through the crowded east side of the city were taken off by the receiver, the mayor was responsible for the substitution of motor 'buses. Thus far the operation of the buses appears to be a success. Five-cent fares have been charged.

CALENDAR

Oct. 6-11—Detroit, Arena Gardens, closed car show; Detroit Dealers' Association.

Oct. 9-10—Jackson, Miss., second annual convention of Louisiana-Mississippi Association.

Oct. 15—New York, Grand Central Palace, opening of International Farm Tractor and Implement Exchange.

Oct. 15-17—Chicago, Congress Hotel, 26th annual convention of the National Implement and Vehicle Association.

Nov. 3-8—Chicago, Medinah Temple, exhibit of Automotive Equipment Association.

Nov. 7-8—Detroit, Hotel Statler, meeting of National Association of Motor Truck Sales Managers.

Nov. 16-23—New York, Hotel Commodore, Automobile Salon.

Dec. 3-5—Cleveland, annual convention of Automobile Trade Association.

Jan. 3-10—New York, Eighth Coast Artillery Armory, exhibition of commercial cars and accessories.

Jan. 3-10—New York, Grand Central Palace, passenger car show; National Automobile Chamber of Commerce.

HARTFORD MOVES INTO NEW FACTORY IN JERSEY CITY.

Edward V. Hartford, Inc., has moved into a new factory at West Side avenue and Carbon place, Jersey City, N. J. Constantly increasing demands for the Hartford products made larger quarters necessary. The new plant will be for manufacturing purposes exclusively, and no service or attaching work will be done there. Arrangements have been made with the Doty-Demos Co., 224 West 65th street, New York City, to care for all local service, repairs and attaching work, as well as carry a complete line of spare parts for all Hartford products. This station will be known as the "Hartford Shock Absorber Service." Executive offices have been moved to 35 Warren street, New York City. All return material must go direct to the factory in Jersey City. The company requests that every order placed with it contain complete shipping instructions, as it will not be able to make any New York deliveries. The new arrangements will enable the company to give better service than ever before.

HENRY FORD PLANS STEAMSHIP LINE TO IRELAND.

A report from London that Henry Ford is considering the establishment of a steamship line to Ireland has been corroborated by Charles E. Sorensen, superintendent of the Henry Ford & Son Tractor Co. Mr. Sorensen said that a number of American industrial concerns, having Irish branches, had been asked by the Irish commission now in this country to provide means of shipping to and from Ireland. The Ford interests, with a branch at Cork, he said, were asked to do so, and a representative of the Cork Development Association conferred with Mr. Ford, who promised to consider the request.

THEODORE F. McMANUS HAS OWN BUILDING.

Theodore F. McManus, Inc., Detroit, is now occupying its own building at 44 Hancock avenue, east. The steady growth of the business made it necessary for Mr. McManus and his associates to seek larger quarters. The main floor of the new building is given over to the production department and the general office. The second floor is occupied by the executive offices and copy staff. Mr. McManus established his main office in Detroit 10 years ago. He has been a potent factor in bringing advertising to its high level.

NEW OFFICIALS FOR FIELD MANUFACTURING CO.

F. J. Bosma, formerly district representative for the Parry Manufacturing Co. of Indianapolis, has been appointed sales manager for the Field Manufacturing Co., maker of commercial bodies, with headquarters at Owosso, Mich. The former sales manager, A. L. Ditter, has been made general sales manager.

NOTES OF THE INDUSTRY AND TRADE

Providence, R. I.—The American Sales Corporation has been formed with \$10,000 capitalization to deal in automobiles and accessories here. The incorporators are Joseph J. Luckina, North Smithfield; Grosvenor A. Stannard and J. Lincoln Holmes, Providence.

Boston—So great has become the demand for demountable winter tops for motor cars that the Universal Top and Body Co. has been compelled to obtain larger quarters and has moved into the building at 10 Scotia street, where it occupies three floors. N. W. Thompson is manager.

Jersey City, N. J.—Thomas D. Lynch, deputy water register, and J. George Hahn, Jr., have formed a partnership under the name of Lynch & Hahn, to distribute Goodrich tires. The new firm will take over the business of the Akron Rubber Tire Co. and will have a service station at 291 Newark avenue. Hahn was the principal owner of the Akron company.

Boston—Walter G. Masters, for the last seven years sales manager of the Mitchell-Lucas Motor Co. here, has resigned to join Harrison D. Dockray, president of the New England American Motor Car Corporation, 94 Massachusetts avenue, in the management of sales of the American Balanced Six.

Boston—The new Fay-Allen automobile building, to cost \$350,000, will be built at 732 Commonwealth avenue.

Jersey City, N. J.—Work is proceeding rapidly on the \$150,000 building adjoining Odd Fellows' Hall in Bergen square, which will house the local agency and service station of Buick, of which A. R. Southworth is the head. It will be ready for occupancy about Jan. 1. Archie Elder, president of the Hudson County Oakland Motor Car Co., has an option on the present Buick quarters.

Jersey City, N. J.—The business of Cole and Dixon, Inc., an automobile concern at 535 Communipaw avenue, this city, and with an office at 17 Front street, Newark, recently declared bankrupt with \$200,000 liabilities, has been placed in the hands of ex-Judge Mark A. Sullivan as receiver.

Hartford, Conn.—Harry C. Brook of this city has been elected president of the Broad Brook Co. as a development of the purchase by William Wiese & Co. of New York of a majority to the capital stock of the Broad Brook Co. William Wiese & Co. makes automobile linings and for some time has been interested in getting a mill in which it could have complete direction. The mill was established in 1847.

Wilmington, Del.—Walter Jackson and Brothers will build a \$35,000 garage in Guyer's court. The building will have a capacity for 75 machines and will be two stories high, 80 by 98.

Wilmington, Del.—F. L. Smith has taken over the U. S. Garage at 409 Orange street.

Goodyear's Deaf Mutes Great Baseball Players

A BASEBALL team which has made a name for itself in northeastern Ohio is the Silent team of the Goodyear Tire & Rubber Co. All the members are deaf mutes in the employ of the big rubber company. Their season's record of 12 victories out of 16 starts, for a percentage of .750, is an indication of their class as a team, and shows that their affliction is not much of a handicap when it comes to playing baseball, for all of their games have been played with teams other than mutes, many of them strong independent teams. They have a strong following among their



Deaf Mutes on Goodyear Team.

own people and receive much encouragement from the "bleachers," from the "silent" fans who "root" in their own peculiar manner, by signs. Now that the baseball season is over they have organized into a football team.

Boston—Norman Halliday, manager of Mack trucks here, has fully recovered from throat trouble, for which he underwent operations some months ago.

Wilmington, Del.—The United Auto Stores, Inc., Philadelphia, which has a Delaware charter, has increased its capitalization from \$25,000 to \$5,000,000.

Trenton, N. J.—The New York Motor Car Device Co., Newark, has been incorporated with \$100,000 capitalization by William G. Huguley, Newark, and G. A. and Herbert Knillschritt, both of Irvington.

Wilmington, Del.—Rolls-Royce of America, to manufacture airplanes, balloons, boats, etc., has been chartered here with \$15,000,000 capitalization.

Wilmington, Del.—The Atlas Motor Car Co. has been chartered in this state with \$5,000,000 capitalization by M. L. Harty, S. L. Mackey and M. C. Kelly, Wilmington.

Wilmington, Del.—The Lexington Distributing Corporation, to deal in all kinds of vehicles, automobiles, etc., has been chartered in this state with \$4,500,000 capitalization by Frank B. Amsted, Con-

nersville, Ind.; Charles W. Gestor, New York, and Oscar T. Mitchell, Chicago.

Albany, N. Y.—The Weiss Motor Sales Corporation has been chartered with \$50,000 capitalization by H. Weiss, A. C. Schwarz and M. H. Brayer, 1893 Broadway, New York City.

New York—The C. & F. Garage, Inc., has been incorporated with \$5000 capitalization by M. Frank, W. and S. Cohen, 60 West 144th street.

New York—The Cleveland Automobile Sales Corporation, with E. R. Hunnewell as general manager, will be established very soon in its new headquarters at 1746 Broadway. In the meantime the sales department will continue to operate in the show room of the Hulett Motor Car Co., Inc., at Broadway and 62nd street.

Syracuse, N. Y.—The Onondaga Auto Electric Service has been incorporated with \$75,000 capitalization by W. H. Craig, W. N. Henderson and J. M. Dunne.

Elizabeth, N. J.—The Hurlbert Motor Car Co. has been incorporated with \$25,000 capitalization by W. B. Harley, Jr., of Paterson, N. J., and J. H. Young and P. J. Haas, Jersey City. The company will do business here.

White Plains, N. Y.—Thorn & Thorn, auto business, has been incorporated with \$20,000 capitalization by S. Weiss, E. Flander and J. Shalleck, 51 East 42nd street.

Brooklyn, N. Y.—The No. 197 Clifton Place Co., garage, has been incorporated with \$20,000 capitalization by N. R. Green, F. A. McGurk and B. B. Butler, 60 Wall street, New York City.

Boston—The Master truck is now represented here with salesrooms at 1035 Commonwealth avenue. A new company has been organized to handle it, comprising Charles D. Willcutt, president; M. W. Chipman, vice president; Myron L. Crowe, treasurer, and Walter V. Hennigan, general manager and assistant treasurer. D. Earl Brackett will represent the parent company in New England.

Albany, N. Y.—The Garland Automobile Co. has opened a salesroom for the Velie and Briscoe cars at 348 Broadway, with E. L. Rolfsen in charge. Mr. Rolfsen has for the past season been in charge of sales for the company at Syracuse, N. Y.

New York—The Muller Sales Corporation, wholesale auto equipment, has been incorporated with \$10,000 capitalization by W. H. Muller, Jr.; A. F. Tompkins and R. Eisinger, 640 Riverside drive.

Brooklyn, N. Y.—The L. & I. Motor Car Corporation has been incorporated with \$5000 capitalization by J. A. Pepperson, M. and M. Lifshitz, 320 Pennsylvania avenue.

Boston—Following an operation, George V. Taggart, New England manager of the Vim truck, is back on the job.

Personal Mention of Men in Industry and Trade

L. H. Earle has been engaged as eastern representative for the Buda Co., Harvey, Ill., and offices have been established at 1216 Aeolian Hall, 33 West 42nd



L. H. Earle, Eastern Representative, Buda Co., Harvey, Ill.

street, New York City. He was connected with the Continental Motors Corporation as designing engineer from 1911 to 1913, and from 1913 to 1916 as sales manager. He was before that connection chief engineer for the Abbott Motor Car Co., from 1909 to 1910, and he was with the Chalmers Motor Co. in 1908, being connected with the engineering staff. Mr. Earle was also in business under the name of Earle & Boggs, Inc., manufacturers' representatives, after leaving the Continental corporation, and in 1917 entered the United States army. He organized and developed the inspection service for Caterpillar tractors, used for artillery haulage and tanks, and was a captain in the Ordnance Corps when he was retired last spring.

Harry C. Brownless is now district manager for the McGraw Tire and Rubber Co. His headquarters will be at the new Detroit branch. Mr. Brownless was with the Goodyear organization for over nine years.

Earl L. Vosler has been elected secretary of the Fruehauf Trailer Co., Detroit, Mich. He has been with the company for two years as sales manager. The company is preparing to erect a new plant, which will permit a large increase in production, and an addition to capital, which is now \$250,000, will greatly amplify the company's resources.

G. F. Barnewall has become manager of the Barney Sales Co., Detroit, distributor in Michigan and Northern Ohio for Blue Streak spark plugs and other devices. He was formerly with the Chalmers Motor Co., Canada, and during the war engaged in production of Liberty engines at the Aluminum Casting Co.'s plant in Detroit.

Charles P. Grimes has become development engineer of the Root & Van Dervoort Engineering Co. and will have charge of the dynamometer testing laboratory to be installed.

Robert C. Lees, formerly special representative for the Overland, has become manager of the St. Louis district for the Willys-Knight.

C. J. Brethaur has become production manager of the Olympian Motor Car Co., Pontiac, Mich. He was with the Commerce Motor Car Co. and later with the Walden Shaw Taxi Co.

Frank Kretzer has gone to Cuba, the West Indies, Porto Rico, Jamaica, the French West Indies and the Dominican Republic to look after the interests of the Gibson Co., Indianapolis. He has been identified with the company for nine years.

John Kelly has been appointed general sales manager of the Edison Storage Battery Co., Orange, N. J. He was for 9½ years New York district manager of the company. His previous experience was with the Westinghouse Storage Battery Co., the Firestone Tire and Rubber Co. and the Swinehart Tire and Rubber Co.

H. F. Harris has been made general manager of the Bethlehem Motors Corporation, Allentown, Pa., manufacturer of Bethlehem trucks and tractors. Mr. Harris is well known as an industrial engineer, he having been connected with the Everett, Studebaker, Maxwell and Overland companies in different capacities, and for the last two years he was associated with the Republic Motor Truck Co., Alma, Mich., serving as general sales manager the latter part of his connection with that concern and suc-



H. F. Harris, General Manager, Bethlehem Motors Corporation, Allentown, Pa.

cessfully completing several large undertakings. Statement is made that Mr. Harris' appointment does not imply any changes in the Bethlehem organization.

V. M. Smith has been made superintendent of the Supreme Motors Corporation, Warren, O., which is now perfecting its organization. He was previ-



V. M. Smith, General Superintendent Supreme Motors Co., Warren, O.

ously to this connection with the Hudson Motor Car Co., where he was production manager of Essex engines. Formerly Mr. Smith served as general superintendent for the Continental Motors Corporation and he was before that association assistant superintendent for the Lycoming Foundry and Machine Co. at Williamsport, Pa., and he was prior to that assistant superintendent for the Mercer Automobile Co. at Trenton, N. J.

Henry G. McComb is now New York representative of the Weidely Motors Co., Indianapolis.

F. C. Knight, for the last 14 years in the implement and tractor field, has returned from overseas service and has been appointed assistant manager of the J. I. Case Plow Works, St. Louis, Mo.

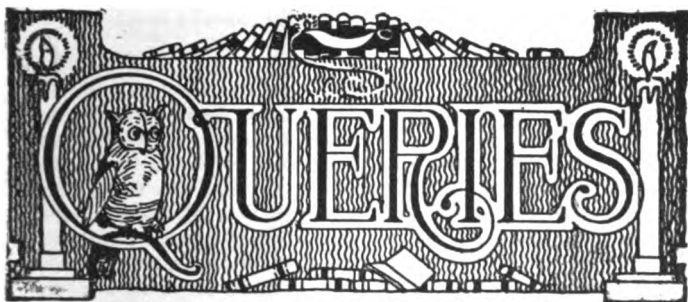
William J. Hartman now has charge of the branch at Los Angeles of the Advance Rubber Co., New York. He worked for many years at the factory.

William H. Huff has been appointed advertising manager for both frame and wheel divisions of the Detroit Pressed Steel Co. He has been associated with the company for some time as assistant sales manager of the frame division.

Erwin L. Malone has been appointed Cleveland district representative of the Ness Steel Corporation, Baltimore, Md.

Dan McAvoy succeeds O. A. Olson as Omaha branch manager of the Pennsylvania Rubber Co. For the year past he has been traveling representative for the company in Nebraska and Iowa.

William A. Cahill, formerly with the Chalmers and Packard, has been placed in charge of the used car department of the Buick Boston Co., Boston.

**TROUBLE IN HUPP '15.**

(J. W. L., Louisville, Ky.)

What is the trouble with my model K '15 Hupmobile? When it fires there are explosions in the exhaust. It runs very well for a while and then it will begin to miss and finally stop. There is a strong spark at the timer, but it will not start for some time after being cranked. There is also a spark at the timer when the switch is off in your short circuit across the breaker points. Should it spark there at all with switch off, if there isn't a short? Have examined the switch and failed to find a short, but the batteries run down with the switch off. The breaker points are in bad shape. Would sticking valves cause it to explode in the muffler?

There should be no spark at the interrupter points when the switch is open. This, coupled with the fact that the batteries run down, indicates a short circuit which should be located and the wires taped. If this does not stop the muffler explosions, inspect the exhaust valves for proper clearance and grind those that are badly pitted. Carbon on the valve stems might have a tendency to hold them open, allowing the gas to pass by while the cylinders are on compression. Examine the stems for carbon accumulation and if present remove it with a strip of emery cloth, holding the valves in a vise while removing the carbon.

STORAGE BATTERY QUESTION.

(R. L. J., Logansport, N. Y.)

Please answer the following question to settle a controversy: Does a storage battery store up current or not? Some say that it does and some say not. Is it anything like the action of a Leyden jar or a condenser?

Electricity in current form cannot be stored. It passes through the storage battery in charging and changes the chemical nature of the cells. When discharging the chemical reaction of the cell gives off electricity. A Leyden jar stores up static electricity, which is quite another thing.

ENGINE KICKS BACK.

(T. K. B., Lanesville, Ind.)

My engine kicks and at times will not start. I am afraid to try it again. Please give me a list of causes for an engine kicking.

If your engine is warm, carbon or overheating may be the cause. The spark too far advanced, or an ignition short circuit in the distributor or spark plug wires might be the cause. In your particular case possibly the rotor of the distributor has loosened from the drive shaft. Take the car to an experienced repairer and have the rotor properly set and your trouble will probably disappear.

ENGINE KNOCKS.

(H. P. C., North Attleboro, Mass.)

Have had trouble with my engine knocking for over a year. Have put in new piston rings and recently put in a new camshaft and bearings and tightened all connecting rod bearings, yet the knock is still there. It is more noticeable on a hard pull on high. Sometimes I do not hear it and at times it can be heard when the engine is running idle. What would you advise?

As you have disposed of the crankshaft and the camshaft and probably inspected the connecting rods, the only thing remaining is piston slap. This occurs when cylinders and pistons are badly worn and can only be removed by having the cylinders ground and new rings and pistons fitted. Doubtless you have cleaned the combustion chamber of carbon accumulation.

STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACT OF CONGRESS OF AUG. 24, 1912, OF

**THE AUTOMOBILE JOURNAL,
PUBLISHED MONTHLY AT PAWTUCKET R. I.
For October 7, 1919.**

State of Rhode Island, County of Providence.

Before me, a Notary Public, in and for the state and county aforesaid, personally appeared William H. Black, who, having been duly sworn according to law, deposes and says that he is one of the owners of the Automobile Journal, and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management, etc., of the aforesaid publication for the date shown in the above caption, required by the act of Aug. 24, 1912, embodied in section 443, Postal Laws and Regulations, printed on the reverse of this form, to wit:

1. That the names and addresses of the publisher, editor, managing editor and business managers are:

PUBLISHER, WM. H. & D. O. BLACK...Pawtucket, R. I.
EDITOR, EUGENE NORTON.....Providence, R. I.
BUSINESS MANAGER, WM. H. BLACK..Pawtucket, R. I.
MANAGING EDITOR, FRED E. BLACK..Pawtucket, R. I.

2. That the owners are:

WM. H. BLACK.....Pawtucket, R. I.
D. O. BLACK.....Pawtucket, R. I.

3. That the known bondholders, mortgagees and other security holders owning or holding one per cent. or more of total amount of bonds, mortgages or other securities are:

M. J. BLACK, Mortgagee.....Pawtucket, R. I.

4. That the two paragraphs next above, giving the names of the owners, stockholders and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company, but also in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association or corporation has any interest direct or indirect in the said stock, bonds or other securities than as so stated by him.

(Signed) WILLIAM H. BLACK, Co-Partner.
Sworn to and subscribed before me this 7th day of October, 1919.

(Signed) CHARLES F. McALEVY, Notary Public.
[Seal] (My commission expires June 30, 1920.)

V. A. NIELSEN CO.
708 Beacon Street Boston, Mass.

**We Do Any
Electrical Auto-Repairs**

*Immediate Return Reliable Work
Absolute Guarantee*

Factory Depot for N. E. Distributors
Connecticut Ignition Stokes Carburetor
Dealers' Parts List Ready Agents Wanted

MAY WE DO YOUR WORK

(When Writing to Advertisers, Please Mention the Automobile Journal.)



ZENITH CARBURETOR

*All That Its
Name Implies—*

THE HEIGHT OF PERFECTION

You cannot secure more efficient and economical carburetion than by the Zenith. Simplest to adjust, and once adjusted stays adjusted.

Known the world over as the

ZENITH OF CARBURETOR EFFICIENCY

A long list of American builders of cars, trucks and aeroplanes believe this simple, plain tube device to be the best insurance for permanent carburetor satisfaction.

Zenith Carburetor Co.

New York Detroit, U. S. A. Chicago



METZ Master Six

The car of the Year

A New England Product

Honest through and through

\$1695 F. O. B. factory FULLY EQUIPPED

We are now extending our agency list
Information at request

METZ SALES CORPORATION
BOSTON, MASS.

TROUBLE WITH CHANDLER CLUTCH.

(L. S. K., Long Island.)

I have a 1914 Chandler Six. Have had considerable trouble with my clutch, which seems to stick. It is all right when the car is in motion, but after standing over night it takes quite a time before I can shift gears and to do so I have to jam them into mesh. I was told that the oil I was using was too heavy and mixed one-third oil with two-thirds kerosene. The mixture served for a time and then the old trouble returned. Could you tell me if the clutch on this model should be used dry or if I am doing any harm trying different oils? I also note a scratching sound when using kerosene when the clutch is out.

The remedy for your clutch is apparently a thinner oil during the colder months, while in summer the ordinary mixture of half engine oil and half kerosene should be right. A method commonly followed by drivers is called double clutching and may be used with good results in your case. That is, in shifting the gears when first starting, the lever is thrown so as to get into reverse gear first, this stops the clutch from spinning and allows the operator to change to first at once without clash of gears. The reason for this is that the reverse is geared considerably lower than the first and the spinning clutch does not effect the gear change to such a marked degree as when shifting direct into first. The cause of the spinning clutch is that the oil is cold and stiff in the morning when first starting and the plates will not separate enough with this film of oil covering them to allow the clutch to come to a stop so that the gears may be shifted quietly. When the oil has become warmed with use this trouble will disappear.

DIFFERENCE BETWEEN MODEL 56 1916, '17 AND '18 PEERLESS.

(G. M., Montreal, Que.)

Kindly state in the inquiry column of the Automobile Journal the differences between 1916, 1917 and 1918 Peerless model 56 cars, so I may be able to distinguish them. Do the serial numbers of the car indicate the year of manufacture?

Answering the last question first, the serial numbers on the plates on the inside of dashes under the hoods indicate the year of manufacture, and these members are probably the best determination of the year of the car. Cars manufactured during 1916 are numbered consecutively from 160001 to 169000, cars of 1917 from 170001 to 179000, and 1918 cars from 230001 up.

Slight changes were made in the engine, such as only a mechanic could distinguish; for instance, in the 1918 engine the camshaft was changed and the shape of the push rods operating the valves were altered.

The 1916 car has the large Atwater Kent ignition system, while the 1917 and 1918 have the improved Atwater Kent system.

Tufted upholstery was used in the 1916 cars, while the 1917 and 1918 cars have pleated upholstery. Changes were made in the body design, but one couldn't identify the year unless cars of the three series were seen side by side.

CHAIN TROUBLE.

(N. O. A., Harrisville, Ia.)

Kindly let me know how to make the chain on my timing gears run more quietly. It makes a noisy rattle, which is very annoying. My car is a 1915 Overland, which has run 30,000 miles.

The fact that your car has been driven 30,000 miles and this rattle only recently became noticeable is remarkable, as it would be expected that considerable wear would take place after driving that mileage. From your statement this is apparently the first instance of this kind. Some engines are provided with an idler that bears against the chain to quiet it, and this idler may be set up from time to time as wear takes place and the chain stretches. In your case possibly the better method would be to purchase and install a new chain.

(When Writing to Advertisers, Please Mention the Automobile Journal.)

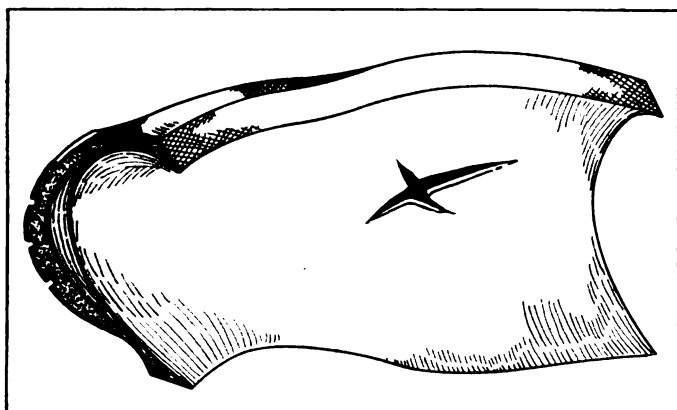
DEFINITION AND CAUSE OF STONE BRUISE.

(J. R. B., Lakeville, Mass.)

What is meant by a "stone" bruise and how is it caused? How do the tire adjusters consider it when adjusting a tire on a mileage basis?

A stone bruise in a pneumatic tire or casing is due to striking a stone or other hard substance while running at high or medium speed with the casing partially deflated. Stone bruises usually are found on the tread of the casing, or slightly to one side, and are caused by the shoe striking an object with considerable force, causing the fabric to crack. Such a bruise weakens the shoe for further use and it really is not safe to use unless an insert is placed in the shoe between casing and tube.

Stone bruises are repaired by cementing a strip of heavy canvas to the inside of the shoe and cementing it to the edge or bead. The tread is usually not damaged, although it may



be somewhat weakened by the impact and rarely needs attention on account of the rubber, which is of a soft nature and gives during the impact rather than cutting.

Tire adjusters assume that a stone bruised shoe has been damaged by an outside source and in making adjustment take into consideration how the bruise was caused and may offer to have the shoe repaired at their expense at the factory and continue the guarantee for the balance of the life of the shoe.

Many manufacturers sell their tires on a guaranteed mileage basis. Some companies guarantee their product for 3500 miles only, while others guarantee their tires as high as 8000 miles, the guarantees of individual firms vary between the above figures. A few tire manufacturers have proposed doing away with the tire guarantee, considering it trade competition that had best be simplified. These manufacturers are considering plans and one or two of them have actually put into practice a plan guaranteeing tires to give satisfaction to the customer. They believe that this policy is preferable to a straight guarantee.

FORD ENGINE OVERHEATS.

(H. A. S., Silverton, Cal.)

I have a 1914 Ford and it overheats very quickly. The trouble seems to be in the water system. The water at the top of the radiator will be boiling, and when I open the drain out cock at the bottom to let water out the first three or four quarts will be cool and the rest will be boiling. The car seems to be in good mechanical condition except the overheating. What is wrong with it?

Your cooling system is badly clogged. Dissolve a pound of washing soda in hot water and pour it into the radiator, straining through muslin or cheese cloth. Fill the radiator with water and use the car as usual all day. This will dissolve what is clogging the radiator and water jackets of the cylinders. If this treatment does not stop your trouble remove the radiator and run pressure steam in at bottom outlet to loosen the sediment. The soda solution should be drained out at night after the day's work and fresh water supplied.

(When Writing to Advertisers, Please Mention the Automobile Journal.)

PUT
LOT-A-PEP
TRADE MARK
IN YOUR GASOLINE
AND GET
MORE POWER WITH LESS GAS
MORE MILES AT LESS COST
CARBON ELIMINATION AT NO COST
FOR

**Automobiles—Trucks—Tractors or
other Gas Engines.**

GUARANTEED To Contain No Insoluble Matter
or Clogging Sediment.

\$2.50 FOR A QUART CAN

All Shipping Charges Paid By Us.

Positive Saving Equal to 30 Gallons

SPECIAL ADVERTISING OFFER

Send for 1 Quart—use half and if not pleased with results return balance and we will refund entire price paid, offer good 30 days from date of purchase. Suitable discounts to all dealers and jobbers.

THE PANVAR COMPANY

618 BULLETIN BUILDING,

PHILADELPHIA, PA.

THE LASTING FINISH
Panvar
TRADE MARK

WHAT PANVAR IS

A lustrous, lasting, transparent liquid to take the place of varnish, beats varnish in lustre, lasts quite as long, is self-leveling, not said to be, but actually is, for Panvar is as thin as water, so it can level itself and not show brush streaks, but when it dries it dries harder than varnish—free from stickiness, can be used on the metal, wood, seats, tops and plated parts—of itself Panvar can not turn white, creamy or craze—it's a lasting, livening up preparation that has varnish beaten in a hundred ways—ANY NOVICE FOLLOWING SIMPLE INSTRUCTIONS CAN APPLY WITH ASSURANCE OF SUCCESS.

PANVAR is prepared for cars where ground paint is in good condition, but varnish has become dull, worn, or needs livening up. Such cars can be made to look like new in an hour's time.

FIX-A-MAR COLORS IN TUBES
If there are bruised places in the ground coat of paint, buy a tube of our FIX-A-MAR color to touch up the marred parts. at \$1.00 per tube delivered. SEND STAMP FOR COLOR CARD.

TWO QUARTS ENOUGH FOR LARGE CAR

If finish is much worn, two coats may be necessary. Easy proposition for anyone, so why neglect your car, or pay a big price for an expensive repainting job.

SEND QUART

WE PAY PARCEL POST CHARGES
Add 25c per quart to points west of Rockies.
SMALL TEST SAMPLE 25 CENTS

THE PANVAR CO., 618 Bulletin Bldg., Philadelphia, Pa.

Send by express or parcel post paid.....quarts.

Name.....

Address.....

Garage Owners and Dealers, write for discounts and sales helps.
Discounts to Jobbers and Dealers.



The Hotel Wellington

7th Avenue at 55th Street
NEW YORK

Located in the center of the Automobile industry, theaters and shopping districts, conveniently reached from all steamships and railroad terminals. The beautiful Central Park is within three short blocks of the hotel.

RATES

Room with use of bath, one person.....	\$1.50 & \$2
Room with use of bath, two persons.....	2.50 & 3
Room with bath, one person.....	2.50 & 3
Room with bath, two persons.....	3.50 & 4
Parlor, bedroom and bath, 1 or 2 persons..	5.00 & 6
Parlor, bedroom and bath, three persons..	6.00 & 7
Parlor, 2 bedrooms and bath, 3 or 4 persons	7.00 & 8

Special rates can always be arranged for extended periods on contract, and rates vary with the desirability of the quarters selected, the number of people in the party and the length of stay.

Operated under the Knott Management.

S. M. EATON, Manager.

PAIGE

The Most Beautiful Car in America

A complete line
of touring and
enclosed models.

Write for Literature.

Paige-Detroit Motor Car Co.

DETROIT, MICH.



Giant Searchlight

The highest quality lowest priced
lamp produced.

With Mirror.....\$6.00

LIST PRICE Without Mirror...\$5.00

CULVER-STEARN'S MFG. CO.

Worcester, Mass.
Detroit, Mich.

The Automobile Journal

A QUALITY MAGAZINE, WITH PRESTIGE AND CIRCULATION THAT BRINGS RESULTS TO ADVERTISERS

TIMES BUILDING :: PAWTUCKET, R. I.

(When Writing to Advertisers, Please Mention the Automobile Journal.)

KEROSENE FOR CLEANING CARBON.

(W. B. S., Los Angeles, Cal.)

Is there any danger of damaging an engine by putting kerosene in the valves to clean out the carbon? About how much kerosene would you pour in each valve of a Buick Little Six to clean out the carbon?

It is usually considered good practise to put kerosene into the cylinders once a week to reduce carbon. Have the engine hot, pour about half a teacupful into each cylinder through the spark plug openings. This gives off a heavy vapor as it strikes the hot cylinder walls and pistons. Crank engine a few times with the starter to force the vapor into the carbon and loosen it. Let it stand over night. The next morning run the engine as usual. The surplus kerosene burns and so takes care of itself.

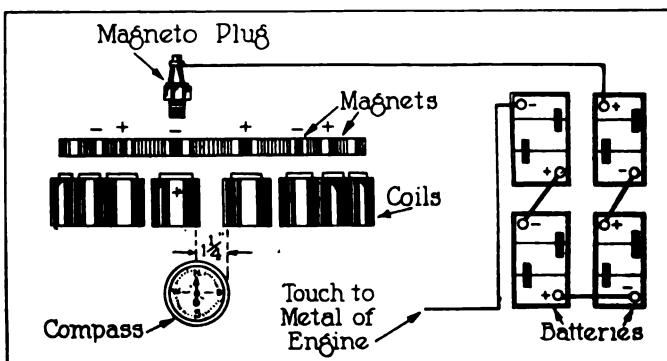
FORD MAGNETS REMAGNETIZING.

(F. H. S., Saylesville, R. I.)

Tell me through the columns of the Journal how to remagnetize the permanent magnets of the Ford magneto after they have become so weakened the magneto will not develop normal current.

The Ford Motor Co. does not recommend remagnetizing the magnets of any Ford magneto, claiming the most satisfactory method is to have the old magnets replaced, either at one of its service stations or at the factory.

It is possible to remagnetize the permanent magnets of Ford magnetos without disassembling them by the method explained and shown in the cut. The magneto coils are used as energizing electro-magnets and with the permanent magnets positioned so that their poles are directly opposite the ends of the cores in the coils, remagnetizing may be done



by passing a heavy current through the coils.

One of the coils in the magneto, from which connection is made with the magneto contact terminal, is about 1½ inches at the left of a center line drawn lengthwise through the terminal post. With the battery connected as shown the current will flow through the coils in such a way that the first coil at the left of the center will be made an electro-magnet with its positive pole towards the permanent magnets, this being the proper relation of the electro and the permanent magnets for the operation.

Hold an ordinary pocket compass near the rear side of the flywheel housing with its center about 1¼ inches to the left of the center line of the engine, which is established by the position of the magneto terminal. With the wire disconnected from the magneto terminal and the compass in position, slowly crank the engine until the north pole of the compass needle points straight ahead as shown, this indicating that the south or negative pole of a permanent magnet is directly in front of the compass and therefore directly in front of the core of the first coil. The correct relation of all the parts is shown in the illustration.

A direct current of from 20 to 30 volts is required and this may be conveniently secured by connecting four six-volt batteries in series, or any number of batteries or dry cells which will deliver the desired voltage.

The positive terminal of the series of batteries should then be connected with the magneto terminal and a length of wire attached to the negative terminal of the batteries.

With the magneto parts in the positions described the end of the length of wire from the negative terminal of the batteries should be touched to the metal of the engine, held there for not more than one or two seconds. This touching the metal with the wire should be repeated from 10 to 15 times. Each time the connection is made and broken the engine will be noticeably jarred, this being caused by the attraction of the coils and the permanent magnets. This will increase the strength of the permanent magnets, but it will not be as satisfactory as if the old magnets were replaced.

FORD ENGINE TROUBLE.

(G. G. H., Haydensville, O.)

Kindly answer through the query column of the Automobile Journal the following. The first cylinder of my Ford car, 1916 model, apparently does not fire. The other three cylinders fire perfectly, as shown when grounding either of these three plugs to the engine. The engine will decelerate, but when the first cylinder is grounded no appreciable lessening of power is noticed. I at first thought the trouble was caused by a poor plug, but have used two new plugs in the cylinder without improvement. The coils were examined for sticking vibrators, but were found to work well. The wires were examined for worn insulation or breaks, but were found to be in perfect condition. The carburetor was next examined, as I thought that possibly the mixture was not normal, but found that the trouble was not here, as the valves are working perfectly, opening and closing on time and that the mixture was correct. The spark plugs were tested out of the cylinders, by laying them on top of the cylinders, with a battery current, turning the engine over slowly so that each plug would spark in regular order. All plugs showed a good spark under this test, and when placed in the cylinders and the crank turned were heard to give a good spark in the cylinders. This is the first time that I have failed to locate a cause of failure on my car and I would appreciate an answer.

Loss of compression in the front cylinder would cause a trouble similar to the above. Remove the plugs from the three good cylinders and try the compression of the poor cylinder. If you are able to turn the engine by this cylinder without any effort and no compression is felt you may rest assured that the valves are in poor condition and need grinding, or that the cylinder is scored or worn out of round, so the gas escapes past the piston. Grind the valves and try the compression a second time. If the compression is still weak you may come to the conclusion that the cylinder is scored or the cylinder is out of round, due to lack of lubrication.

It is a well known fact among repairers of Ford engines that the lubricating system of the Ford engine is faulty. All oil for the front end of the Ford engine is supplied by a tube running from a point near the flywheel to the timing gears at the front. From the timing gears the oil flows to the rear over the base plate of the engine, filling the troughs under the connecting rods as it flows. This is practically all the lubrication that the engine receives while operating and the first cylinder receives the smallest amount. In connection with the lubrication, whatever dust that passes through the radiator is drawn in by the fan, more or less of the dust settling around the oil filling spout, where it is drawn into the base, collects in the oil and works up and into the first cylinder, scoring the cylinder walls and cutting the piston and rings.

This action soon wears the cylinder out of round, causing it to lose compression, misfiring, etc. The only repair that is permanent in a case of this kind is to rebore the cylinder, lapping in an oversize piston and new rings. To make the job satisfactory all four should be rebored and over size pistons lapped in and the engine will pull with all cylinders having an equal compression.

Examine the timer, as this trouble might be caused by a dirty or worn timer. Possibly the wire leading to number one coil may be frayed, allowing the current to escape to the frame and return to the magneto, causing a short circuit of that coil and plug. Wires are bound to get oil soaked near the timer after a while.

(When Writing to Advertisers, Please Mention the Automobile Journal.)

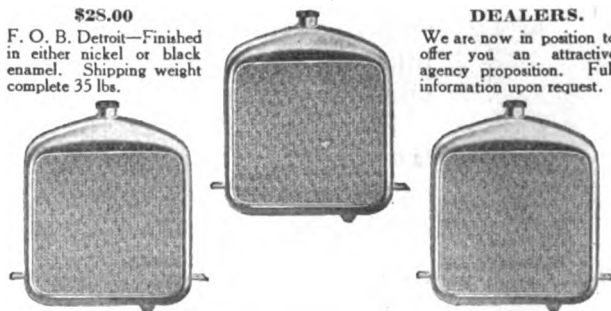


\$28.00

F. O. B. Detroit—Finished in either nickel or black enamel. Shipping weight complete 35 lbs.

DEALERS.

We are now in position to offer you an attractive agency proposition. Full information upon request.



NATIONAL ZIG ZAG RADIATOR THE FORD RADIATOR QUESTION

NO Ford owner will argue about his need of a better cooling system.

They all voluntarily admit it.

It is then simply a question of which radiator should be adopted.

When we say, concerning the National Zig Zag Radiator "Per Pound of Metal the most efficient radiator built," we are stating a long acknowledged fact.

There isn't any question about its ability to eliminate your ever present radiator ills.

Scientific construction principles of National Zig Zag Radiators guarantee that.

Greater water space—more cooling surface—keeps them constantly cool.

A pre-arranged safety factor—extreme expansion and contraction flexibility—prevents them from freezing.

Let us put you in touch with our nearest dealer.

NATIONAL CAN COMPANY

DETROIT

(Radiator Division)

MICHIGAN

For Fall and Winter



In Gears Won't Harden or Freeze

Our scientific process makes NON-FLUID OIL adhesive and preserves uniform density without loss of lubricating value.

USE

"K-00 Special" for gears

"K-000" for all bearings

New York & New Jersey Lubricant Co.

165 BROADWAY, NEW YORK

COES *The Standard WRENCH*



WRENCHES that are made for the hardest service. They do not break but grip and hold and their efficiency never lessens.

Economy tools as they last longer, give better service and never become useless through wear.

Utility wrenches of the highest order for car owners and repairers as they can be used in compact places and once set hold like a vise.

*The Best Wrench
The Cheapest*

All dealers carry in stock the exact size to meet your need. They recommend Coes Wrenches as all good dealers have for more than fifty years.

COES WRENCH COMPANY
WORCESTER, MASS.

DIXON'S GRAPHITE Transmission and Differential LUBRICANT

Gears and bearings run more smoothly and last longer when lubricated with Dixon's Lubricants. They put an end to all lubrication troubles.

Also ask your dealer about Dixon's famous Cup Grease.



Made in Jersey City, N. J. by the
JOSEPH DIXON CRUCIBLE COMPANY
Established 1827



NEW DEPARTURE BALL BEARINGS



*Strength
Stamina
Service*



The New Departure Manufacturing Co., Bristol, Conn.
Conrad Patent Licensees

FORD STARTING TROUBLE.

(B. H. J., Cooperstown, Pa.)

I have a Ford car that will not start until a rear wheel is jacked and a rear wheel turned with the clutch in. After it is once started the jack may be removed and the engine runs fine, and it will start the first time that the engine is cranked. Have tried putting warm water in the radiator mornings before attempting to start it, but that did not help. Could you tell me what is the trouble?

This is a cold weather trouble that all Fords are subject to. Either your magneto is weak or, as the case indicates, you are not getting enough gas for the initial start. After the engine has started it gets warm rapidly, allowing you to start readily by cranking. Open the needle valve about a one-half turn for starting, and after the engine has been run for a few moments, gradually close the needle valve to its original position. If it is the gas that is causing the trouble, this will surely show it. If the magnets of the magneto are weak or the spark gap at the plugs too great, opening the needle valve will not improve the condition. The above test will show this and you can readily tell if the fault is in the magneto or plugs.

If the magneto is weak, take the car to a good Ford repairer and have new magnets placed in the magneto, as it is not practical to remagnetize the old magneto outside of the Ford factory.

TIMING IGNITION ON PEERLESS EIGHT.

(J. T. C., Attleboro, Mass.)

Some time ago I wrote you for information on how to time the Peerless Eight, and you sent me directions for the adjustment of the carburetor. I wish you would let me know how to time the breaker points. Should the distributor be removed on the engine getting out of time?

I am sending you special directions on timing the Peerless Eight. The type of ignition used on this car is the Atwater Kent system, and since you did not mention the year in which the car was made, the directions herewith cover types K-2 and C A, the former being installed on those made in 1917, and the latter on 1917-18 cars. The K-2 has no spark advance lever.

In timing the piston of No. 1 cylinder it is raised to high dead center, between compression and power strokes; then with the clamp which holds the unisarker loose, the unisarker should be slowly and carefully turned backwards or counter clockwise (contrary to the direction of rotation of the timer shaft), until a click is heard. This click happens at the exact instant of the spark. At this point clamp the unisarker tight, being very careful not to change its position.

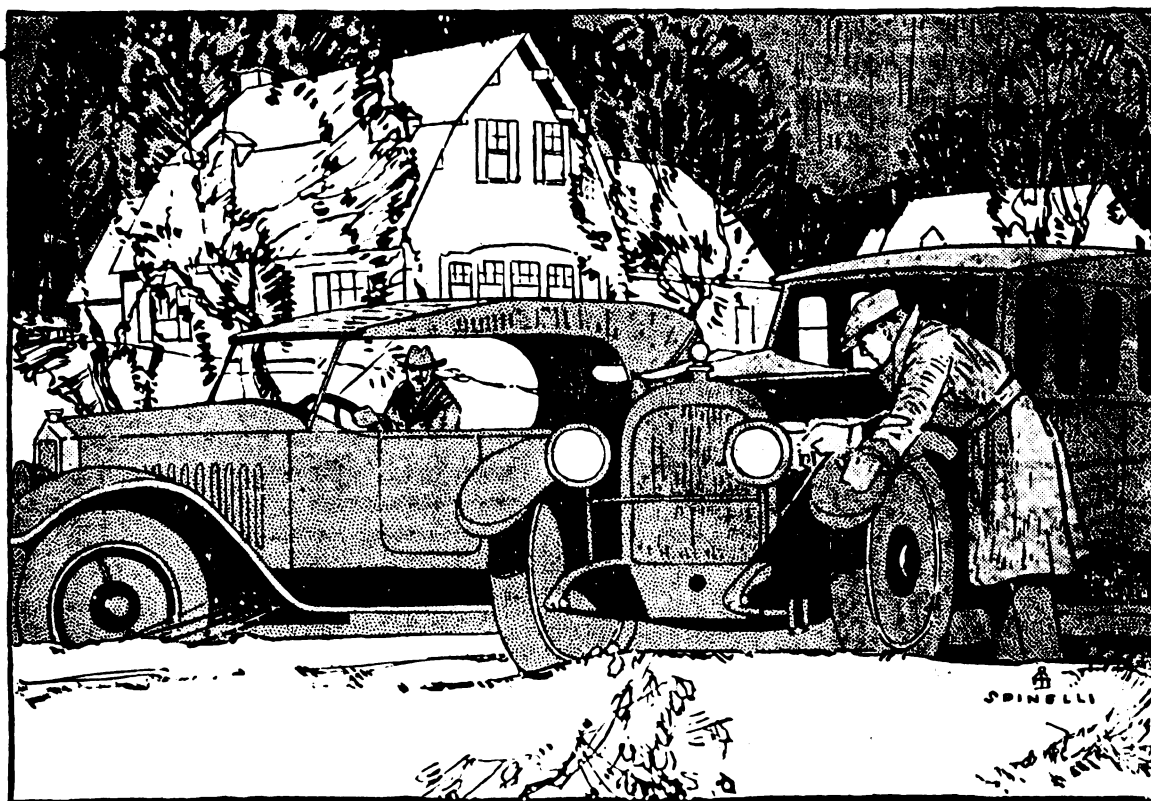
Now remove the distributor cap, which fits only in one position, and note the position of the distributor block on the end of the shaft. The terminal to which it points is connected to No. 1 cylinder. The other cylinders in their proper order of firing are connected to the other terminals in their turn, keeping in mind the direction of rotation of the timer shaft.

When timed in this manner the spark occurs exactly on center when the engine is turned slowly. At cranking speeds the governor automatically retards the spark for safe starting, and as the engine speed increases the spark is advanced automatically, thus requiring no attention on the part of the driver.

We will now consider type C A system as used on the 1917-18 Peerless Eight. In timing the piston of No. 1 cylinder it is raised to high dead center, between compression and power strokes; then loosen the clamp which holds the unisarker, and the unisarker should be carefully turned backward or counter clockwise (contrary to the normal direction of rotation of the timer shaft) until the contact points commence to open. At the exact instant of the opening of these points the spark occurs.

By having the electrical connections made complete the current can be turned on and the unisarker timed exactly from the spark produced at the plugs. For this purpose the plug should be laid out on the top of the cylinders.

(When Writing to Advertisers, Please Mention the Automobile Journal.)



THERE is satisfaction in knowing why a motor refuses to "turn over" on a cold day. It may be battery trouble superinduced by too much work—pulling against cold, stiff lubricants. It might be other inward troubles of the motor for the same reason.

Most winter troubles may be eliminated by using the proper oil—of proper cold test. We suggest

SUPREME AUTO OIL

as a cure for such troubles.

It flows freely at Zero—starts with the engine—gives instant lubrication—relieves the pull on the starter, likewise the battery. It leaves less carbon, hence less pre-ignition—you should use it.

Supplied by any dealer displaying the sign of the Orange Disc.

GULF REFINING COMPANY

General Sales Offices : Pittsburgh, Pa.

District Sales Offices

**New York
Atlanta**

**Philadelphia
New Orleans**

**Boston
Houston**

TRADE MARK
EAGLEINE
 REGISTERED
MOTOR OILS



EAGLEINE OILS

are unequalled for motor lubrication, freer from carbon, economical because they protect the motor against mechanical wear, and the quantity required is comparatively small.

These are the claims of thousands of motorists,—some with years of experience, who want full value, and more who know the value of high grade lubricants, and who know when they obtain satisfaction.

EAGLEINE QUALITY IS INSURE TO YOU

A grade for every type of motor. It is sold in sealed containers.

*Let us send you our new book and chart.
 It is free at request.*

EAGLE OIL AND SUPPLY CO.
44-45-46 India Street, Boston, Mass.

NEW YORK CITY
Woolworth Building

CHICAGO
1132 W. 37th Street

AUTOMOBILE JOURNAL

INDEX TO ADVERTISERS

	Page
Associated Business Papers, Inc.....	6
Atwater Kent Sales Co. of N. E.....	4
Auto Products Co.....	4
Barrett Co., The.....	59
Barrett Motor Starter Manufacturing Co., Inc.....	61
Boston Auto Tire Exchange.....	5
Boston Retread Tire Co.....	4
Brightman Auto Exchange.....	4
Broadway Tire Jobbers Co.....	4
Brown Spring Oil Co.....	59
Coes Wrench Co.....	64
Connecticut Auto Parts Co., Inc.....	4
Crosby Co., S. L.....	4
Culver-Stearns Manufacturing Co.....	62
Dixon Crucible Co., Joseph.....	64
Eagle Oil and Supply Co.....	2
Flaherty, Wm. H. Co.....	5
Gastine Co.....	Cover
Grant Motor Car Co.....	61
Gulf Refining Co.....	1
Heiser Special Tool Co.....	59
Hotel Wellington.....	62
Jackson Motor Service Co.....	5
Lawson Co., F. H.....	61
Liberty Tire Co.....	4
Magneto and Generator Exchange of N. E.....	5
Magneto Shop.....	5
Metz Sales Corporation.....	60
National Can Co.....	63
New Departure Manufacturing Co.....	64
New York and New Jersey Lubricant Co.....	63
Nielson Co., V. A.....	60
Paige-Detroit Motor Car Co.....	62
Pierce-Arrow Motor Car Co.....	Cover
Reo Motor Car Co.....	7
Standard Oil Co. of N. Y.....	Cover
Strandway Auto Parts Co.....	4
Syracuse Rubber Co., Inc.....	Cover
Wellington Hotel.....	62
Zenith Carburetor Co.....	60

SHOW NUMBERS

Passenger Car Shows } *New York, Chicago, Boston*

3

**GREAT SHOWS
GREAT EDITIONS
GREAT BUSINESS
NUMBERS**

Power Truck Exhibitions } *New York, Chicago, Boston*



Dates of Show Issues:
New York, Dec. 26
(forms close Dec. 20.)
(Show Held Jan. 3-10.)

Chicago, Jan. 18 (forms
close Jan. 15.) (Show
Held Jan. 24-31.)

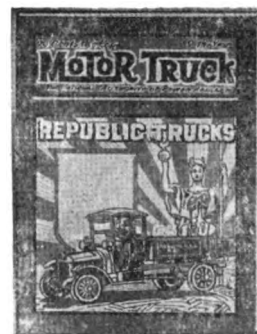
Boston, March 10
(forms close March 4.)
(Show Held March
13-20.)



Dates of Show Issues:
New York, Dec. 26
(forms close Dec. 20.)
(Show Held Jan. 3-10.)

Chicago, Jan. 18 (forms
close Jan. 15.) (Show
Held Jan. 24-31.)

Boston, March 10
(forms close March 5.)
(Show Held March
13-20.)



Dates of Show Issues:
New York, Dec. 20
(forms close Dec. 15.)
(Show Held Jan. 3-10.)

Chicago, Jan. 15
(forms close Jan. 13.)
(Show Held Jan.
24-31.)

Boston, March 5
(forms close March
1.) (Show Held March
13-20.)

Early space reservation is urgently requested. Write or wire for rates, insert information, special copy and positions. Kindly specify magazines to be used.

Automobile Journal Publishing Co.
PAWTUCKET **RHODE ISLAND**

TRADE OUTLET

TIRES

JOB LOTS

Obsolete, Surplus Stocks and
Factory Seconds

WRITE—CALL

BROADWAY TIRE JOBBERS

250 West 54th Street

New York

AUTO SAVE 50-90% PARTS

POPE, PACKARDS, PIERCE, BUICK,
STEVENS-DURYEA, KNOX, OVER-
LAND, ETC.

Motors,	\$25.00 up	Presto Tanks,	\$4.50 up
Magnetos,	4.00 up	New Spotlights,	2.00 up
Carburetors,	3.00 up	Generators,	10.00 up
Rear Axles,	15.00 up	Gears,	1.00 up
Front Axles,	5.00 up	Bearings,	1.00 up
Cylinders,	5.00 up	Radiators,	10.00 up

\$12 Diamond Bumpers.....\$5.50

Jobbers in Bankrupt Auto Supplies.

BRIGHTMAN AUTO EXCHANGE

321 Windsor Ave., Hartford, Conn.

AUTO PARTS.

50% to 90% Off List.

24 Hour Service. Unlimited Stock.

Pope-Hartford, Columbia, Reo,

Overland and 200 other makes.

Motors, \$20.00 up E. Presto Tanks, \$4.00

Magnetos, \$3.50 up B. Presto Tanks, \$4.75

Cylinders, \$3.00 up Bearings, 50c up

Springs, \$1.00 up Rims, \$1.00 up

1000 Other PARTS Bargains.

If you want any part not listed here,

Write Us—We Have It.

Conn. Auto Parts Co., Inc.

18-20 Morgan St., Hartford, Conn.

Atwater-Kent Sales Co., of New England

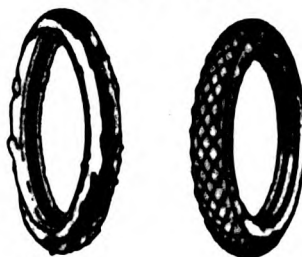
883 BOYLSTON ST., BOSTON, MASS.

Official
SALES AND SERVICE
For New England.

Complete stock of parts always
on hand.

Write for Price List.

BOSTON RETREAD TIRE CO.



Before

After

OUR METHOD OF RETREADING IS
DIFFERENT FROM OTHERS.

We use all Goodyear first quality stock
and retread bands and can absolutely
guarantee from

3000 to 3500 Miles.

We will replace a new tire for every
one that our work does not give satis-
faction.

Tires called for and delivered. We pay
express charges one way on all out-of-
town orders.

Price List Mailed Upon Request.

BOSTON RETREAD TIRE CO.

70 Clarendon St., Boston, Mass.

AUTO PARTS—At Your Own Prices.
We can supply parts for nearly every
make of car. 648 Packards, Interstate
Fours, also Truck parts, GMC and
other makes.

Write us for Parts. We have them.

STRANDWAY AUTO PARTS CO.,
193-195 H. St., South Boston, Mass.

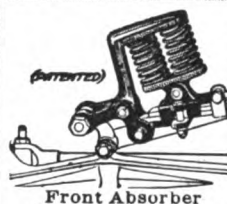
TIRES AND TUBES

Demonstrating and Factory Repaired.
Economy, Qual-
ity, Price. All
Standard
Makes.

Size	Tires	Tubes	Size	Tires	Tubes
30x2	\$5.00	\$1.35	36x4 1/2	9.25	1.75
30x3 1/2	6.00	1.45	36x4 1/2	9.50	1.90
32x3 1/2	6.50	1.50	36x4 1/2	9.75	1.85
31x4	7.25	1.65	35x5	10.50	2.00
32x4	8.00	1.80	37x5	11.00	2.20
33x4	8.75	1.70			
34x4	8.75	1.70			

Write for Prices on Odd Sized Tires. TERMS:
\$1.00 deposit with each tire ordered, balance C.
O. D. subject to inspection. Specify style of
rim to avoid delay. Although used tires are not
guaranteed for any definite number of miles,
we guarantee our tires to give the best
service in proportion to the prices paid, or rea-
sonable adjustments are made.

LIBERTY TIRE CO., 2119 So. Michigan
Ave., Dept. I, Chicago, Ill.



Front Absorber

Champion Shock Absorber Sales Co.,
Inc., Indianapolis, Ind., Mfs.

FOR FORD CARS.

"Champion" Shock
Absorbers. The perfect
spring suspension. Ab-
sorbs all jar and re-
bound. Easy to attach.
Pulls up guaranteed.
Makes Fords ride as
easy as any \$5000 car.
Ford dealers, agents
and owners, this ad is
worth \$10 to you. Ask
why. Write today.

CHEMIST AMAZING DISCOVERY.
25 Miles on One Gallon Gas.
MOTOROL, 25 to 50% more miles per
gal. 25 to 35% more power.
Means faster ignition, uniform combus-
tion, no carbon deposits, less wear and
tear on motor, higher test of gasoline.
Agents Wanted. One Dollar Postpaid.
AUTO PRODUCTS CO., Dept. 70, 226 W.
138th St., N. Y.

FOR SALE—A new Roof Type B, 16
Valve Cylinder Head with Miller Car-
buretor, at a bargain. The S. L. Crosby
Co., Bangor, Me.

—CLASSIFIED ADVERTISING PAYS—

Advertise the bargains that you have
to offer.

8000 Buyers Read MOTOR TRUCK.

TRADE OUTLET

At 304

Columbus Ave.
For K-E-E-P-S

304

Selling Slightly Used Tires. The Largest Stock in the East. "Your Money's Worth or We Make Good." Remember Our Prices Will Interest You.

Size	Tires	Size	Tires
30x3	\$4.50 down to \$2.40	33x4½	\$12.00 down to \$6.00
30x3½	6.50 down to 3.40	33x5	14.50 down to 8.00
32x3½	8.75 down to 3.90	35x4	10.50 down to 9.00
31x4	8.00 down to 4.00	34x4½	10.00 down to 6.00
32x4	8.25 down to 5.00	35x4½	12.00 down to 6.50
33x4	9.00 down to 5.50	36x4½	12.00 down to 6.00
34x4	10.75 down to 6.00	35x5	25.00 down to 6.90
32x4½	12.00 down to 7.00	36x5	12.00 down to 8.00
		37x5	14.00 down to 6.00

USED TUBES, ALL SIZES, AT \$1.50 TO \$2

MAIL ORDERS given prompt attention. Tires sent C. O. D. with privilege of examination. 5% discount if cash or money order comes with order.

BOSTON AUTO TIRE EXCHANGE
304 COLUMBUS AVE. TEL. B. B. 7329

Magneto Repairs

Skillfully Done. Assured Satisfaction. Prompt Service.

The repair work turned out of this shop is of the highest merit—because I know how. If you have electrical and magneto troubles, no matter whether it is a

BOSCH, SPLITDORF-EISEMANN, or any other make, I can fix them. My well-appointed plant, coupled with skilled workmen, assures you of expert magneto service. Send in your magneto. 24-hour shipment.

Rebuilt Magnetos, Platinum Parts, Generator Brushes, Bearings, Etc.

Correspondence Invited.

The Magneto Shop

JOHN BRUNSWICK,

147 Massachusetts Ave., Boston, Mass.

Magneto and Generator Exchange of N. E.

44 COLUMBUS AVENUE, BOSTON, MASS.

SAVE 50%

Offers

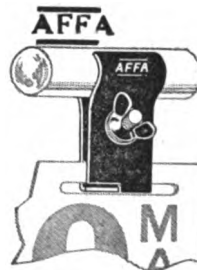
Quality Service for your car.

Starting, Lighting, Ignition.

One year guarantee on repairs and installations of all makes.

Everything pertaining to Auto, Electricity, Magneto and Generator Parts. We have one of the best equipped shops in New England devoted exclusively to this work.

BOSCH, SPLITDORF, EISEMANN, DIXIE, BERLING MAGNETOS
and Parts Always in Stock.



SPECIALTIES for the Ford

They stop the rattle in—

The Brake Rod Supports for 35c.

The Brake Rod Clevises for 50c.

The Spark and Throttle Rods for 25c.

The Steering Spindles for 50c.

They serve many other useful purposes and are

Inexpensive.

JOBBER, DEALER, write for prices and folder which mean money for you.

Affa Specialty Co., 34-D Southbridge St., Worcester, Mass.

Tires Guaranteed 5000 Miles

30x3 plain.....	\$8.00
Non-Skid	\$10.00
30x3½ plain.....	\$11.00
Non-Skid	\$13.50

Big saving on other sizes and tubes also. Trade in your old tires. 20% deposit required on C. O. D. orders.

Write for lists to

M. Liben & Co.

793 J 7th Ave., New York City.

JACKSON PARTS

ALL YEARS and MODELS

Prompt and Satisfactory Service Guaranteed.

Jackson Motor Service Co.

Brighton District,

Boston, Mass.

SALESMEN AND DEALERS—A million Ford owners are waiting for you to show them the only safety steering attachment; takes that jerk out of the Ford steering wheel and makes it steer like a Packard; pays for itself in tire saving; put it on your car and dozens want it; if you have small capital and can put canvassers out to sell the owners, selling yourself to the trade, you can make a small fortune. Write today. Saxton Auto Accessory Co., Inc., 347 Fifth Ave., New York City.



BOSTON'S Finest Equipped Auto Electric Repair Service

With a staff of trained electrical men we can offer auto owners expert service, coupled with promptness and personal attention to all electrical repair problems. We also repair any electrical equipment used on a motor car. Official service and parts representative for

AUTO-LITE LIGHTING AND STARTING SYSTEMS.
Complete Stock of
GENUINE PARTS.

All Work and Parts Guaranteed.

William H. Flaherty Co.

74 CUMMINGTON ST., BOSTON, MASS.

(When Writing to Advertisers, Please Mention the Automobile Journal.)

Is Merchandise Properly *SOLD* To You?

YOU recognize the direct connection between production methods and the cost and quality of the goods; you have a right to know that goods are properly made. Yet the manufacturing, important though it is, is but the first lap on the journey to the consumer. Merchandise must be sold; sales cost is just as legitimate as manufacturing cost, and it has just as direct a bearing upon the final cost to you. If needless expense is incurred, it means either higher prices or a decrease in quality or service.

Obviously it will pay you to recognize efficient selling service. With this simple truth clearly in mind, permit us to enunciate an established, proven sales principle—

LIST OF MEMBERS

Each has subscribed to and is maintaining the highest standards of practice in their editorial and advertising service.

Advertising and Selling
American Architect
American Blacksmith
American Exporter
American Funeral Director
American Hatter
American Machinist
American Paint Journal
American Paint and Oil Dealer
American Printer
American School Board Journal
Architectural Forum
Architectural Record
Automobile Dealer and Repairer
AUTOMOBILE JOURNAL
Automotive Industries
Bakers Weekly
Boot and Shoe Recorder
Brick and Clay Record
Buildings and Building Management
Building Supply News
Bulletin of Pharmacy
Canadian Grocer
Canadian Railway and Marine World
Candy and Ice Cream
Chemical & Metallurgical Engineering
Clothing and Furnisher
Coal Age
Coal Trade Journal
Concrete
Cotton
Daily Iron Trade & Metal Market Report
Domestic Engineering
Dry Goods Economist
Drygoodsman
Dry Goods Reporter
Electric Railway Journal
Electrical Merchandising
Electrical Record
Electrical Review
Electrical World
Embalmer's Monthly
Engineering World
Engineering and Mining Journal
Engineering News-Record
Factory
Farm Machinery—Farm Power
Foundry (The)
Furniture Manufacturer and Artisan
Furniture Merchants' Trade Journal
Furniture Journal
Gas Age
Gas Record

—The seller who advertises in the Business Papers reaching **ONLY** the class interested in his message, is using the most direct and economical method of helping you maintain an intelligent contact with your sources of supply.

This kind of advertising bears the same relation to the sales department that an improved machine does to the production department. And if the sales methods are wasteless and efficient, you seldom need worry about the goods. Each acts as a support and stimulus for the other.

On the other hand, the practise of buying circulation by the million in the hope of influencing a few thousand possible customers, is open to question. The best machine is a source of waste when improperly used, and this is no reflection on the machine. Concentration beats scatteration, and costs less. The right tool in the right place is a principle of as much importance to selling as to production.

There are many other reasons why discriminating buyers are giving preferred consideration to the concerns which tell them their business story in the buyer's own business paper, especially if that paper has subscribed to the high standards of practice of The Associated Business Papers, Inc.

LIST OF MEMBERS

(Continued)

Grand Rapids Furniture Record
Haberdasher
Hardware Age
Heating and Ventilating Magazine
Hide and Leather
Hotel Monthly
Illustrated Milliner
Implement and Tractor Age
Industrial Arts Magazine
Inland Printer
Iron Age
Iron Trade Review
Lumber
Lumber Trade Journal
Lumber World Review
Manufacturers' Record
Manufacturing Jeweler
Marine Engineering
Marine Review
Metal Worker, Plumber and Steam Fitter
Mill Supplies
Millinery Trade Review
Mining and Scientific Press
Modern Hospital
Motor Age
Motorcycle and Bicycle Illustrated
Motor Truck
Motor World
National Builder
National Druggist
National Petroleum News
Nautical Gazette
Northwestern Druggist
Northwest Commercial Bulletin
Nugent's, The Garment Weekly
Oil Trade Journal
Power
Power Boating
Power Plant Engineering
Price Current—Grain Reporter
Railway Age
Railway Electrical Engineer
Railway Maintenance Engineer
Railway Mechanical Engineer
Railway Signal Engineer
Retail Lumberman
Rubber Age
Shoe Findings
Shoe and Leather Reporter
Shoe Retailer
Southern Engineer
Southern Hardware and Implement Journal
Sporting Goods Dealer
Starchroom Laundry Journal
Tea and Coffee Trade Journal
Textile World Journal
Timberman
Transfer and Storage
Woodworker

THE ASSOCIATED BUSINESS PAPERS, INC.

JESSE H. NEAL, Executive Secretary

HEADQUARTERS: 220 West 42nd Street NEW YORK CITY



REO

A Policy That Pays

ISN'T IT REMARKABLE how that Reo "Speed Wagon" continues to hold its lead in popularity among buyers?

IT JUST GOES TO PROVE that the maker who plans for the the "long run" may also win out in the sprint.

REO EXPERIENCE and Reo foresight developed this type of commercial vehicle in the first place.

PNEUMATIC TIRES, electric starter and electric lights were first incorporated in a motor truck when this Reo "Speed Wagon" was designed.

THAT LEAD THEN GAINED has been maintained by Reo quality.

ONLY PROBLEM Reo Distributors have—or ever have had—is to obtain enough Reos to supply the demand.

Reo Motor Car Company
Lansing, Michigan

"The Gold Standard of Values"

AUTOMOBILE JOURNAL

INDEX TO CONTENTS

Published Monthly by the
AUTOMOBILE JOURNAL PUB. CO.
Times Building, Pawtucket, R. I.

WILLIAM H. BLACK.....Treasurer
DAVID O. BLACK.....Secretary

Branch Offices: New York City, Chicago, Detroit,
Boston, St. Louis, Cleveland.

SUBSCRIPTIONS:

United States and Mexico (Postage Paid) the year \$1.50
Canada\$2.50
Foreign Countries in Poston Union.....\$3.50
The Copy.....20 Cents

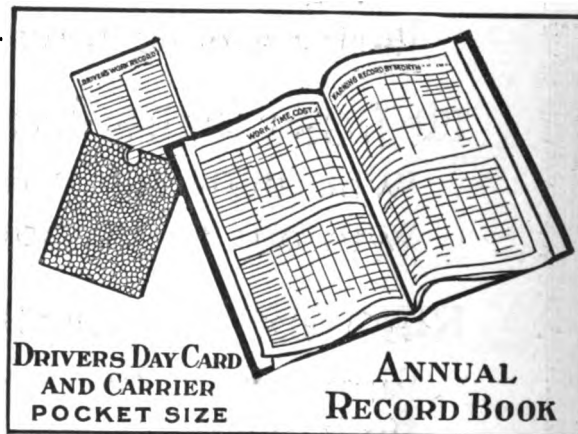
PARTIAL LIST OF CONTENTS

	Page
*Equipment Show at Chicago.....	9
Square Deal Warranty Favored by Service Managers	13
*How to Plan for Drive-In Filling Station, by F. A. Bean.....	17
*Humorous Side of Motoring.....	20
*Durant Has Made Great Success of General Motors	21
*Proper Adjustment of Push Rods.....	23
How to Prepare Automobiles for Storage During Winter.....	24
*Hints for Car Owners.....	24
*Caring for the Storage Battery.....	26
*Lubrication of the Automobile.....	27
*Lubrication Chart.....	32
Troubles of the Oiling System.....	36
*Lawrence Process of Repairing Scored Cyl- inders	39
*Explaining the Condenser.....	40
*Vigilance Will Eliminate Smoke Nuisance....	42
*New Grant Roadster.....	43
*Pressed Steel Wheel for Automobile.....	44
*Spring Lubrication Is Essential in Easy Rid- ing Car.....	45
*Accessories Department.....	46
*New Oldsmobile Designed for Discerning Motorist	56
*New Covering Which Protects Fender.....	57
*Mechanical Queries.....	59

*Indicates Article Is Illustrated.

Know what it costs to Run your Truck
Learn what your Truck Earns
Know your Truck Profit and Loss

UNIVERSAL MOTOR TRUCK ACCOUNTING SYSTEM



The system includes an annual record book, 350 drivers' day cards, a day card carrier and full instructions.

Any owner can start this system at any time with an old or new truck of any make or type.

Any boy or girl clerk can maintain all records for one or a hundred trucks.

Each system is good for one year, nothing more is needed or necessary.

The records show at a glance any and all items entering into the earnings and cost of operation.

It is extremely simple. 100% complete and full working instructions are supplied with each system.

It is almost self-operating.

Price \$10 — Delivered

Address Record Department

MOTOR TRUCK

Pawtucket,

Rhode Island.

THE AUTOMOBILE JOURNAL

VOL. LXVII.

PAWTUCKET, R. I., NOVEMBER, 1919.

NO. 4.

Equipment Show at Chicago Proves a Big Success

*Automotive Association Holds Important Sessions—
Adopts New By-Laws*

WHEN the average motorist notes in the garage, repair shop or auto accessory store the variety of accessories, tools and equipment that are designed to contribute to the greater convenience and comfort of the operator and occupant of the automobile or to add to the utility and aid in the economical maintenance and repair of the car in private or public garage or repair shop, he is almost inclined to wonder if human ingenuity has not reached its limit in catering to the demand for such equipment. But a glance at the reports and a consideration of the results of the annual convention and first annual exhibit of the Automotive Equipment association, held in Medinah Temple, Chicago, Nov. 3-8, would seem to reveal that after all this branch of the automotive industry has by no means reached its zenith for here, displayed in the 161 exhibits that crowded the big building, in addition to all the standard and well established lines made familiar to the motorist through years of use and publicity, covering all conceivable phases of the needs of garages, repair shops and users of passenger and commercial cars, were seen thousands of new appliances, embodying some improved feature or presenting some new angle in automotive equipment.

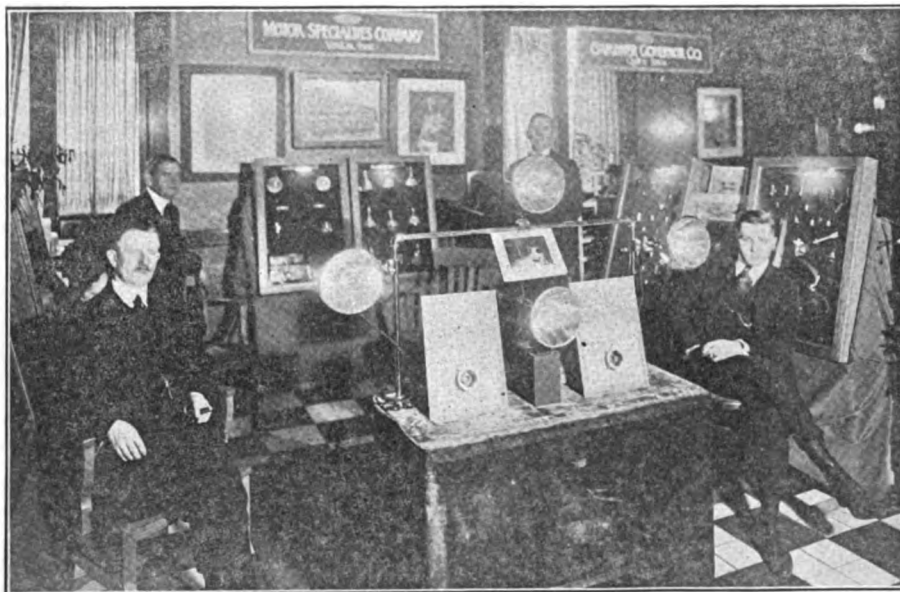
The building in which the convention and exhibit were held was well suited in arrangement and size for an event of this nature, although the management could have filled much more than the

available space, as the number of applicants far exceeded all expectations. The greater number of the displays were on the lower floor, but overflow exhibits were located on the main and upper floors and some were on the stage, while the big auditorium was ideal for the sessions of the convention. The decorations, which were designed by Campbell Brothers of Boston, compared most favorably with those of the big national shows. The color scheme consisted of a

the playing of the national anthem, and invocation by the Reverends John Gibson and Rufus A. White, and each afternoon informal organ recitals were given by Professor Kurzenknabe on the fine organ installed in Medinah Temple, which is said to be one of the largest in the United States. This was a feature greatly enjoyed by many of the visiting members.

Mayor William Hale Thompson, who was on the programme to give the address of welcome,

could not be present on account of unforeseen circumstances, but the city of Chicago was well represented by Harry B. Miller, the prosecuting attorney. After dwelling upon the progress and the spirit of good fellowship manifested in his city, he spoke of the great danger which has harassed the nation for some time and urged every member of the association to do his best individually to stem the tide of foreign influence in the direction of of spreading Bolshevistic propaganda. He painted a picture of the reconstruction days that followed the Civil War in this country and by the way of contrast stated that the period of reconstruction through which the United States is now passing is of far greater moment than the former because of the very danger in which the life of this nation is put through the teachings of ill-advised professional agitators, who are trying to undermine the institutions upon which this nation has been built.



Attractive Booth of Motor Specialties Co., Waltham, Mass., at Automotive Equipment Exhibit at Chicago, Ill.

Florentine setting embodying the high lights of the Italian school, which were contrasted with the deep green background which effectively offset the lighter coloring.

While both the convention and exhibits were open to members of the automotive trade and industry, no invitation to the general public having been extended, many of the matters discussed and action taken were of universal interest. Each session of the convention was opened by

struction days that followed the Civil War in this country and by the way of contrast stated that the period of reconstruction through which the United States is now passing is of far greater moment than the former because of the very danger in which the life of this nation is put through the teachings of ill-advised professional agitators, who are trying to undermine the institutions upon which this nation has been built.



Comfort Was the Idea Exemplified at the Luxurious Headquarters of the Brunner Manufacturing Co.

Harry A. Wheeler, formerly president of the National Chamber of Commerce of the United States, spoke of the activities of that body and also of the efforts made by the industrial conference summoned by President Wilson, of which the speaker was a member, in so trying to work out the problems submitted to them that capital and labor would both get a square deal, and expressed his regret that the conference was broken up because of the determination of a few of the board to stand by Americanism and nationalism, that the foundations of the institutions for which the forefathers bled and died should not be permitted to be sapped. He also suggested the need of financial support for the building of the home of the Chamber of Commerce of the United States at Washington, and for which purpose a suitable location has been selected and purchased, and the association, which is a member of the National Chamber, voted to take the matter under consideration.

Matters of Business Transacted.

The association went on record as favoring the adoption of the national budget system and pledged assistance through the various channels through which the desired results can best be accomplished. The matter of spurious advertising, against which a campaign has been waged by the Associated Advertising clubs of the world, was given due consideration, and the board of governors was appointed a clearing house for all questionable advertising that comes within the range of this association. The restoration of railroads and carrying companies to private ownership was favored.

One of the most important matters discussed was the new constitution and by-laws, which was submitted at the last convention at Hot Springs in June. It was unanimously voted to adopt the same with the amendments recommended by the board of directors.

It was voted that the next convention be held the first week in June, 1920, at Del Monte, Cal.

New Board of Officers.

The following officers were elected:

President, R. R. Engelhart, Sieg Co., Davenport, Ia.; vice president, Robert A. Stranahan, Champion Spark Plug Co., Toledo, O.; chairman, board of directors, Howard M. Dine, Dine-DeWees Co., Canton, O.; vice chairman, board of directors, L. P. Halladay, L. P. Halladay Co., Streator, Ill.

Board of directors—William Von Elm, E. A. Laboratories, Brooklyn, N. Y.; Ivan Goodrich, Goodrich-Lenhardt Manufacturing Co., Hamburg, Pa.; E. R. Waterman, Edward V. Hartford, Inc., Jersey City, N. J.; S. A. Fulton, the Fulton Co., Milwaukee, Wis.; Charles Stahl, Connecticut Telephone & Electric Co., Meriden, Conn.; Robert Weinstock, Weinstock-Nichols Co., San Francisco; C. R. Churchill, Electric Appliance Co., New Orleans, La.; L. A. Cavanaugh, Motor Car Supply Co., Calgary, Can.; Earl Reynolds, Tacoma, Wash.; R. R. Engelhart, Sieg Co., Davenport, Ia.

Committees were also appointed under the following heads: Credential, press, resolutions, membership, finance, federal, trade commission, railroad classification, standardization, good roads and highways, labor and state association.

The association elected to membership 13 jobbers and 12 manufacturers.

The labor situation, from the point of the business man, was set forth in a stirring address by Walter C. Hecker, vice president of the Curtis Pneumatic Machinery Co., St. Louis, Mo.

One of the most important steps taken in the way of constructive work was the authorization of the addition of two field secretaries to work under the supervision of the national field secretary. George Fritz, who with the commissioner, Mr. Webster, will outline the programme to be carried out. It is planned to make this of such a character as to be of far-reaching benefit to the entire trade.

The question of "wholesale only," which received considerable consideration at the last meeting, was again debated, but no definite action was taken, and the matter was tabled for further discussion at the next meeting in June.

Another matter that was discussed at length, but on which no decisive action was taken, was that of co-operation between jobbers and manufacturers and among the jobbers themselves.

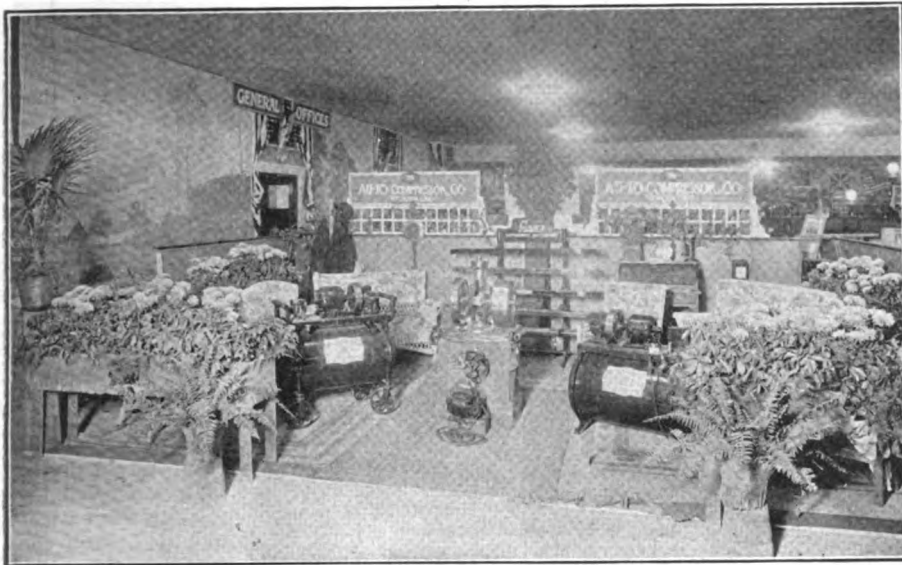
Work on Standardization.

Some of the work accomplished by the standardization committee was among the important features of the convention. This committee met on Monday, in accordance with the scheduled programme. Those in attendance were: Chairman, F. R. Hall, Ohio; vice chairman, William Von Elm, New York; C. L. Wheeler, Utah; W. B. Dean, Michigan; F. H. Suter, Wisconsin; W. F. Parker, Ohio.

The first matter was the consideration of unfinished business passed along by the preceding committee. It was decided that in order to accomplish the maximum amount of good to the association and its members the standardization commit-



Novel Feature of Northwestern Chemical Co.'s Booth, Showing How F. R. Suters Are Made on Ford Car.



Full Line of Au-To Compressor Co. Shown Embowered in Blossoming Plants.

tee should formulate an entirely new method of procedure, using as a basic idea the building of a set of standards which would not only be of value to the association of today, but which would lend themselves to expansion and be the basis of future standards which might be adopted from time to time.

With this thought in mind the committee divided itself into two groups, which were to study the various phases of a programme which would fill the needs of the association. It was unanimously voted to submit to the convention recommendation pertaining to the work of the standardization committee and to the issuance of a permanent record book to be known as the "Hand Book" of the Automotive Equipment association.

It was recommended that any member of the association desiring a hearing on a matter of standardization should seek the chairman of the sub-committee under which his question might properly come, and make arrangements that the question be brought up for discussion at the next regular meeting of the sub-committee.

The standardization committee will discuss and act upon all matters of a standardization nature and all standard practise and all recommended practise as handed on to it by sub-committees. All practises voted on favorably by the standardization committee will be passed on to the board of governors for their consideration, and then to the general assembly for their consideration.

All standard practise and all recommended practise adopted by the general assembly will at once be sent out to all members of the association, and said practise will become a part of the hand book of the Automotive Equipment association.

Hand Book Is Outlined.

This hand book will consist of a loose leaf binder which will be furnished the members at cost by the association. Filler sheets will be furnished each member of the association by the association without charge, and will contain information as follows:

List of officers and board of governors.
List of member companies; their delegates and alternates.

List of member companies and their corresponding secretaries.

List of standing committees and their personnel.

List of sub-committees with their chairman, vice chairman and secretary.

A description of the method of operation of all committees.

The constitution of the Automotive Equipment association.

By-laws of the Automotive Equipment association.

Introduction to the book of standard and recommended practise.

List of standard classifications.

Each binder will contain a full set of index sheets showing standard classifications under which the standard practise and the recommended practise sheets shall be filed as a matter of permanent record and information.

List of Classifications.

It was recommended that the manufacturers now members of the associa-

tion be classified under the headings as given below:

Group

- 1 Tire accessories, patches, reliners, etc.
- 2 Non-skid devices.
- 3 Lamps, bulbs, etc.
- 4 Ignition, spark plugs, etc.
- 5 Batteries and battery supplies.
- 6 Tire covers and fabric goods.
- 7 Bumpers, shock absorbers, etc.
- 8 Chemicals, canned goods, etc.
- 9 Oils and greases.
- 10 Metal goods, tool boxes, etc.
- 11 Gaskets, pipe fittings, etc.
- 12 Brake band linings, clutch facings, etc.
- 13 Welding outfits and supplies.
- 14 Shop equipment.
- 15 Tools and machinists' supplies.
- 16 Package goods, screws, nuts, bolts, etc.
- 17 Piston rings.
- 18 Cut-out outfits and supplies.
- 19 Repair parts for small cars.
- 20 Miscellaneous.

Each of the classifications as above enumerated will have a temporary chairman appointed by the standardization committee. It will be the duty of this temporary chairman to organize the members of his sub-committee, and duly elect a permanent chairman, vice chairman and secretary.

The secretary of each sub-committee shall immediately advise the chairman of the standardization committee as to the personnel of his sub-committee.

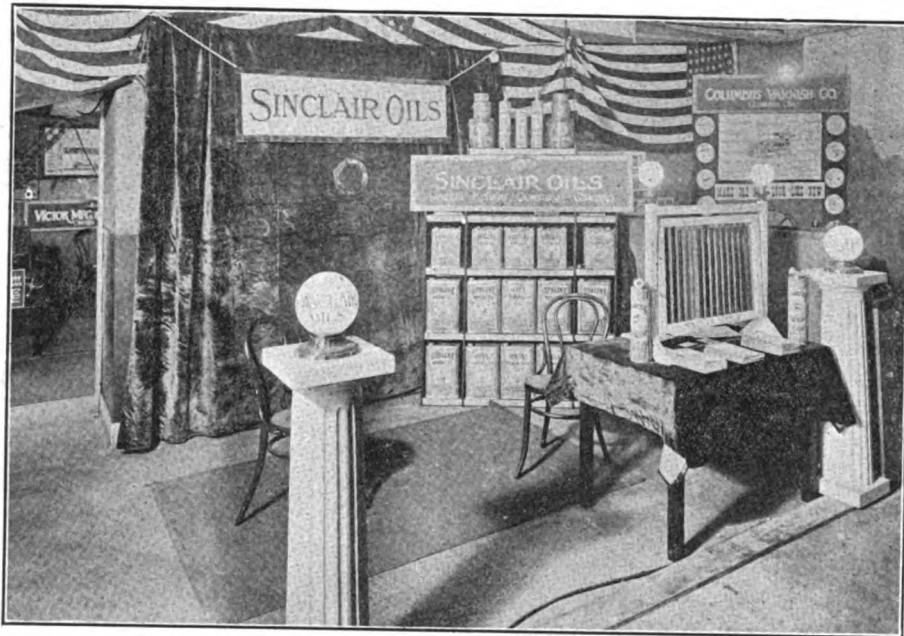
Among the social activities of the week in connection with the meetings of the association was a mock trial and minstrel show put on the evening of the third day in Aryan Grotto Temple, which was enjoyed by over 1200 members and their friends. This was given under the direction of the Chicago Automotive Manufacturers and was full of up-to-date, mirth-provoking features.

Features of the Exhibit.

The exhibit feature, which was a new departure, proved to be one of the most successful events of the kind ever staged



Attractive Dutch Girl Graced Well-Arranged Display of Van Cleef Brothers.



Simple but Effective Exhibit of Products of Sinclair Refining Co.

COLUMBIA SIX MAKES NEW RECORD IN PITTSBURGH-DETROIT RUN.

The recent record-breaking run of the Columbia Six from Pittsburgh, Pa., to Detroit, afforded a striking example of how close the modern motor car has approached the finest passenger trains in the matter of speed and reliability for long distance travel.

Jack Morhardt, production engineer, and Jess Teagarden, field service manager of the Columbia Motors Co., Detroit, left Pittsburgh at 11 o'clock in the morning, planning to drive to Cleveland and to ship the car across the lake by boat. Arriving at Cleveland at 5 o'clock in the afternoon they decided that instead of waiting for the boat they would drive through by motor car. They arrived in Detroit at 11 p. m., completing the entire 376 miles from Pittsburgh to Detroit in 12 hours, practically equalling the railroad running time for the same trip. The average running time, including stops and slow-ups through towns, was over 31 miles an hour.

WALES IN LEXINGTON CAR.

The episode of an heir to the throne of the British Empire enjoying a ride in one of America's handsomest motor cars named in memory of the Minute Men of 1776 is symbolic of the change that has come in the relations between this country and Great Britain in the 150 years that have elapsed since the Revolutionary war.

The young Prince of Wales, during his sojourn in Nanaimo, British Columbia, toured through the streets of that place in a Lexington Minute Man Six, made by the Lexington Motor Car Co., Connersville, Ind. The event carried with it a realization of the friendship that was sealed anew in Flanders and on many other battle fronts, only a few months ago when the sons of John Bull and of Uncle Sam fought side by side against a common foe.

by the association. Manufacturers and exhibitors, without exception, expressed themselves surprised and gratified at the great interest manifested and the volume of business transacted, and had nothing but words of commendation for the committee in charge. The exhibit will undoubtedly be a regular concomitant of the annual conventions of the association; in fact, the commissioner's office has already received requests for space that will in themselves require a larger building than was occupied this year.

The displays were unusually varied and effectively arranged. Some of the booths being particularly artistic in their floral and other decorations and luxurious in their furnishings and accommodations for the visitor. They were all presided over by competent and zealous representatives of the various manufacturers and distributors, in many cases including chief executives and important officials who were enabled to get in close touch with the selling and distributing end of the industry. The fact that there were no mere curiosity seekers among those in attendance put the whole matter on a business basis from the outset.

Through the efforts of the Automotive Equipment Association in arranging such events as this first annual exhibit, the interests of the motorist, garage and repair man will be more efficiently served in the future than ever before.

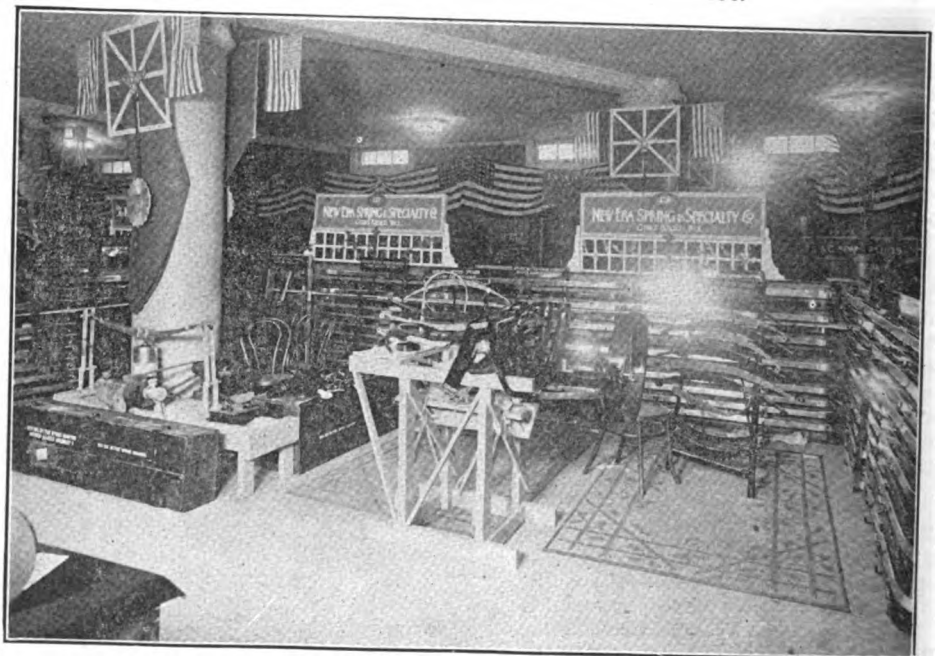
HAYNES COMMUNITY HOUSING PROJECT.

Among the many welfare projects carried out by progressive industrial institutions, that of community housing has been recognized as one of the most important as offering the greatest opportunity for bettering the living conditions of the laboring man. The Haynes Automobile Co., Kokomo, Ind., realizing the benefits that would accrue to its employees from such a project, has formulated plans and begun active work on a comprehensive community housing plan,

which is designed to afford relief to the housing difficulty so far as it affects workers in the Haynes factory.

The project includes the immediate construction of 42 cottages on a choice and picturesque tract of land on the south side of the city of Kokomo and convenient to the factory. Several of the houses are partially completed and the work is being pushed as rapidly as possible under the direction of half a score of competent contractors, as these new homes will be imperatively needed as the new factory unit, now almost completed will require many hundreds of men, who must be provided with homes.

The man who conceived and carried out this housing project, which has for its object the bettering of the living conditions of all Haynes employees without profit to the Haynes company, is A. G. Seiberling, vice president and general manager of the Haynes company.



New Era Spring & Specialty Co. Specialized on Better Springs and Bumpers.

Square Deal Warranty Favored by Service Managers

Detroit Convention, Largest Gathering in History in the Industry, Unanimously Approves Suggestions to Abolish Free Repairs.

Detroit, Nov. 12.—After a two-day session at the Hotel Statler the service managers' convention, called by the National Automobile Chamber of Commerce, seemingly established service as probably the most important problem before the industry. The meeting was the first of the kind ever organized by the controlling body of manufacturers, and the object was to obtain a comprehensive consideration of a subject that has never been satisfactorily determined and has been for years dealt with more by individual than by uniform policy.

The convention was attended by service managers from Boston and San Francisco, from practically every section of the country, and while the largest number was from the states east of the Mississippi river, it was a thoroughly representative assemblage. One will understand the object of the convention when statement is made that while not any one of the men present could by action commit a concern, each could state clearly the policy of the company he represented with reference to service, and present facts which justified an attitude, a plan or a system.

The convention was attended by 143 men, representing 100 different interests, which included 42 manufacturers of passenger cars, 21 manufacturers of trucks and 16 manufacturers of cars and trucks, a total of 79, while manufacturers of engines and parts, manufacturers of tools, dealers, operators of service concerns, exporting companies, manufacturers of fire apparatus and the Motor Transport Corps, U. S. A., with press representatives, made up the remaining 21 of the total stated.

Convention in Four Sessions.

The convention was organized with four sessions, the morning of the first day

being given over to "General Service Policies," the afternoon of the same day to "Factory Service Organizations," the morning of the second day to "Service Relations Between Factory and Dealers," and the afternoon of the second day to "Relations Between Distributors or Dealers and Customers," and the papers presented at each session were pertinent to the general topic.

Broadly stating the general purpose of the convention, the industry as represented by the manufacturers, in the interests of the distributors and dealers, is seeking a policy or plan of operating

to them by manufacturers, distributors and dealers. They do not seemingly comprehend that free repairing cannot be given and that it must be paid for, and that they themselves must pay for it in the initial prices paid for vehicles. Neither do they realize that were this burden minimized or eliminated it would be reflected in the cost of the machines.

Logically, no person can expect something for nothing, and this applies just as well to automobile vehicles as to any other utility. The industry has for years had this burden to contend. Innumerable owners have abused and neglected

machines because they assumed that the manufacturers were paying the bills and they were the beneficiaries. The distributors and the dealers have suffered because of the unwillingness of the manufacturers to assume what are regarded as obligations, and which often were representations made by unauthorized salesmen, who were irresponsible and whose sole object was to consummate sales for their own immediate benefit, causing complications that were frequently far-reaching.

The adoption of what is known as standard warranty by the members of the National Automobile Chamber of Commerce and its predecessors was with the object of limiting responsibility, or more clearly defining it so that there would be no uncertainty on the part of the buyers of vehicles, and this has been generally accepted by the greater number of concerns engaged in the industry. There are, however, some manufacturers, and some distributors and dealers who have not considered themselves bound by the provisions of the warranty, and this has led to a desire for something that would be more equitable and more broadly applied. There has been no desire by the

SALIENT FEATURES OF SERVICE MANAGERS' CONVENTION.

- Organized by the National Automobile Chamber of Commerce.
- Largest gathering of service executives in history of industry.
- Report of committee on revision of service and repair parts policies of N. A. C. C. presented.
- Relations between manufacturers, distributors and dealers with reference to service discussed.
- Convention favors high grade service, but abolition of free repairing for owners.
- Service system and details of general practise reviewed in 12 papers.
- Motor transport corps seeks co operation of industry in parts supply and training men for army emergency needs.
- Proposal to make a service department of the N. A. C. C. a permanent organization indorsed.
- Tentative choice of Indianapolis as the next place for a convention suggested in resolution to N. A. C. C.

which will insure satisfaction to the owners of automobile vehicles and afford adequate maintenance, and while eliminating free service, make possible at all times a service that will be nearer standardization, and so clearly define that service that it will be thoroughly understood by all vehicle owners.

Industry's Greatest Burden Free Service.

Today one of the greatest burdens that the industry has is the expectation of owners that they shall have what amounts to free repairs. They believe that they are entitled to free repairing for a considerable period of time, and assume that this is an inducement held out

manufacturers to shirk responsibility, but there has been no reason why they or their representatives should be burdened by what in the final analysis must be paid for by the user if the concerns producing vehicles expect to operate on sound financial basis.

The subject of service has assumed constantly increasing importance, especially with the extraordinarily high prices for labor and materials, and there can be no criticism of the National Automobile Chamber of Commerce endeavoring to bring about so far as practically possible a uniform policy that will benefit the industry and trade. There is today in use in the United States close to 7,000,000 power vehicles, and one can understand that what may appear to be a very small sum for each will in the aggregate reach a very large total.

Statements Do Not Commit Industry.

One must understand that the expressions of the speakers at the convention do not commit the industry nor those engaged in it to any policy, but they may be accepted as the views which will in no small part influence the National Automobile Chamber of Commerce in its determination of policies, and in recommendations to its members of practise that, no doubt, will eventually be adopted, though possibly not in the form submitted.

In connection with the statements made emphasis should be placed upon the fact that there was no remonstrance nor objection to the general proposition as presented by the chairman of the committee representing the National Automobile Chamber of Commerce. There was practically unanimity of opinion that the industry and trade would benefit and the owners, especially those who were disposed to care for their property would profit by the abolition of free service that ultimately was paid for by users.

Suggest a Mileage Basis.

There was suggestion that instead of a definite period during which certain attention would be given to owners a definite mileage be the basis, and this would afford an elasticity that would meet practically all conditions. Without exception there was agreement that the owner should have every facility for repair and restoration, that the stocks of parts should be such that there would not be loss of service of vehicles, and that the work should be so systematized with reference to adjustment and repair that the cost should be minimized. There was belief that the decrease of service cost would mean increased use of better machines and would automatically broaden the market for them to a considerable extent.

The convention considered service from many aspects, both with reference to policy, operating plans or systems, and details, and the speakers pointed out what they believed were factors influencing the subject under discussion. Many of the service managers had long experience and were qualified to deal with varying aspects and to very fairly present the general policies of the concerns they represented.

Practically all agreed that the manu-

facturers wanted to have the owners well serviced—in fact much better as a rule than they had been served up to the present time—and they realized that the branch or dealer service station ought to be so operated that the owner would be satisfied. There was more or less expression of opinion with reference to independent repair shops and service stations, and some speakers maintained that many of these flourished because of patronage by disgruntled owners; that the distributor and dealer shops ought, if well equipped, organized and operated, afford better service for the same prices than independent shops; that there were conditions in which the independent shops and the dealers could operate co-operatively under the jurisdiction of the factories.

In any event it was up to the factories to determine just the character of service that should be given, and while there was no statement emanating from

SERVICE MANAGERS' CONVENTION WAS REPRESENTATIVE OF THE INDUSTRY.

Total attendance.....	143
Car manufacturers.....	42
Truck manufacturers.....	16
Car and truck manufacturers	21
Engine and Parts Manufacturers	5
Tool manufacturers.....	1
Dealers	3
Service operators.....	4
Fire apparatus manufacturers	1
Exporter	1
Motor transport corps....	1
Press representatives.....	5
Different interests.....	100

the National Automobile Chamber of Commerce there was apparently reason to believe that could a uniform or standardized service be determined and afforded by all distributors and dealers representing the manufacturers directly or indirectly that a condition would be brought about that would greatly benefit the owners.

Each Paper Fully Discussed.

There was discussion of each paper and exceptional interest manifested in each subject. With one or two exceptions there was necessity of limiting the discussion because of the lack of time, and in every instance the sessions were prolonged and ceased only because of the necessity of vacating the apartments. The division of the sessions, so that each considered a general topic and each address of that session applied, concentrated the attention of the service men on specific subjects and the detail with reference to policy or practise was considered to whatever degree was desirable.

The outcome of the convention will undoubtedly be the organization of what will be in effect a service managers' division under the jurisdiction of the National Automobile Chamber of Commerce, which will be organized in sections, much the same as the Society of Automotive Engineers, with a section in each of the large commercial centers, each of which will control its immediate activities and will have frequent meetings, while the main body will have semi-annual or annual conventions at some point that will be central for the greater number of the members.

Probably a Permanent Organization.

This statement is based on the suggestion made by General Manager Alfred Reeves of the National Automobile Chamber of Commerce, who referred to the large possibilities for such a department, and obviously its existence and activities would depend very largely upon the attitude of the controlling body of the industry. The organization will undoubtedly be developed by the N. A. C. C. and it will become an operating factor whenever approval is given and the executives have been determined.

That there was desire of all the service managers to continue the conventions was evidenced by the discussion as to the next gathering, with Detroit, Cleveland and Indianapolis as the suggested places of meeting. The choice of Indianapolis was determined by vote of the delegates and this will be submitted to the directors of the N. A. C. C., which will probably acquiesce to this proposal. Later on, when an operating plan has been determined and the organization is functioning, it will probably be free to choose its places of meeting.

The convention was opened at the Hotel Statler with practically all of the delegates present, by Roy D. Chapin, president of the Hudson Motor Car Co., vice president of the National Automobile Chamber of Commerce, and seated with him on the platform was General Manager Alfred Reeves and E. T. Herbig, chairman of the committee on standard repair parts and service policies of the chamber. After the address Mr. Chapin withdrew and the sessions were continued under the direction of General Manager Reeves and Chairman Herbig.

Five Speakers on N. A. C. C. Committee.
Five members of the committee on standard repair parts and service policies participated in the deliberations of the convention, these being Mr. Herbig, H. W. Drew of the Packard Motor Car Co.; W. M. Ladd of the Pierce-Arrow Motor Car Co., A. B. Cumner of the Autocar Co., and O. T. Hillshafer of the Chandler Motor Car Co., all of whom submitted papers on different subjects. W. M. Britton of the Republic Motor Truck Co. and W. B. Riley of the Jordan Motor Car Co. were not present.

At the opening session, following a statement by Mr. Chapin of the general purpose of the convention and his observations of the interest obtaining in the general subject of service, under the general topic "General Service Policies," the following papers were presented: "Recommendations of the National Auto-

ble Chamber of Commerce Committee on Revision of Service and Repair Parts Policies," by E. T. Herbig, sales manager for the Service Motor Truck Co., Wabash, Ind.; "Service Relations Between Accessory, Parts and Assembly Manufacturers and the Vehicle Manufacturer, the Distributor, Dealer and Owner," by E. A. Haskins, service manager for the Federal Motor Truck Co., Detroit; "Should the Factory Encourage Service by Independent Garages and Service Stations? If So, on What Basis?" by L. C. Voyles, service manager for Nordyke & Marmon Co., Indianapolis, Ind.

Report of Special Committee.

The report of the committee on revision of service and repair parts policies was presented for the information of the convention, largely with a view of demonstrating the conclusions reached after careful study, and with the object of serving the best interests of all concerned. The proposal was to adopt what was termed a "Square Deal Warranty" this to be substituted for the technical obligation and being in fact a set of principles that establish the responsibilities of the manufacturers, distributors, dealers and users. The recommendation applied specifically to the truck industry, because the interest of the committee was primarily in the truck division.

Statement was made that the relations between manufacturer and owner were contingent upon mutual good faith; that the manufacturers should guarantee to make good all their just obligations, expressed and implied, which would insure to the user the maximum of service at a minimum of consistent cost. As the best maintenance results can be obtained with the owner through the distributors or dealers representing the manufacturer, the service obligations of the distributors and dealers should be to carry out the square deal warranty with the owner, to maintain adequate facilities for making repairs, adjustments and general overhauling promptly and competently for reasonable charges, and thoroughly instructing the owner how to operate and care for his vehicles. As the responsibility for the operation and care of the machines is entirely beyond the control of the manufacturer and distributor, upon the user conforming consistently and intelligently to the instruction for care and operation, depends the success of truck service.

Definition of Detail Practises.

The definition of detail practises, establishing manufacturers' responsibility with reference to the replacement of defective parts, was first that within 90 days after delivery the manufacturer will furnish, free of charge at the factory or branch, duplicate parts to replace any parts returned to the factory or branch with shipping charges prepaid, that have been determined by the company to be defective in material or workmanship, or it will put such parts in condition as good as new. Discounts to independent repair shops will be subjected to agreements between distributors or dealers and repair shops; the manufacturers reserve the right to dispose, within 30 days, of all

parts returned, without assuming liability, unless covered by shipping instructions or adjustment is accepted; the manufacturers will refuse to consider claims for or accept for adjustment parts not supplied by them.

Service and replacements on engines, starters, batteries, magnetos, generators, carburetors, tires, rims or other trade accessories not made by the truck manufacturers are to be referred to the nearest service station maintained by the manufacturer of such accessory, and while not assuming direct responsibility the vehicle manufacturer or its branches or dealers will do all that is possible to assure users square deals from the makers of parts and accessories. If the accessory manufacturer is not adequately represented in any particular locality the vehicle dealer there is obligated to give the users good service. The vehicle manufacturers shall provide their dealers with lists of the manufacturers of accessories and parts and lists of their service stations.

Responsibilities of the Dealers.

The responsibilities of the distributors and dealers with reference to inspection and adjustment include monthly inspection without charge at the factory branches or service stations, and this service will be given outside of the service stations at regular charges based on the distance the inspector making report of his opinion of the condition of the vehicle; necessary adjustments to maintain the vehicle in standard operating condition will be made without charge for the first month the machine is in use, provided it has not failed from accident, abuse or neglect, the adjustments being only those the inspector has, in his opinion, found necessary; every dealer is expected to give the same inspection and adjustment service on any vehicle made by the manufacturer without regard to the territory in which it was bought.

All work not included in inspection and necessary adjustment or installation of replacements will be charged for at regular rates; estimates of the cost of work when requested shall be made when possible and the owner advised of the approximate or maximum charge before work is begun. When work is done outside of a service station the time of employees going to and from the work, shipping parts and other necessary incidental expense shall be charged. Overtime work when necessary shall be charged at overtime rates. When a new truck is delivered personal driving and maintenance instruction will be furnished for a reasonable time without charge, but all other personal instruction will be given only in accordance with agreement made by the dealer and buyer at the time of purchase.

The dealer will be required to maintain a minimum stock of both current and service parts as specified by the manufacturer, the current parts being defined as those used in machines now being produced by the factories, and service parts as parts used in machines not now produced. Provision is made that obsolete parts and surplus parts shall be re-

turned by the dealers only by individual agreement with the manufacturer.

Factory Service Organization.

The afternoon session of the first day was devoted to the general topic of "Factory Service Organization," and this included papers on "The Functions of Direct Factory Service Representatives in the Field," by R. C. Reichel, service manager for the Chalmers Motor Car Co., Detroit; "The Improvement of Vehicle Design and Quality Through Service Records," by Walter M. Ladd, service manager for the Pierce-Arrow Motor Car Co., Buffalo, N. Y., and a description of the operating plans of the technical service engineering department of the Packard Motor Car Co., Detroit, by C. R. Lester, manager of that department.

The Second Day's Sessions.

The morning of the second day the general topic was "Service Relations Between Factory and Dealers," and this was opened by a paper on "What the Dealers Require from the Factory Service Department," by Ralph C. Rognon, president of the Automotive Service Association of New York, and followed by "Plan for Regulating Distributors' Parts Stock Supply to Assure Adequate Assortment and Maximum Activity," by H. W. Drew, and "Pirate Parts-Factory Control of the Source of Supply of Spare Parts and Material," by W. M. Warner, manager of the parts department for the Cadillac Motor Car Co., Detroit.

The closing session of the convention was given over to the general topic "Relations Between Distributors or Dealers and Customers," and included papers on "The Extent to Which Free Service to Customers Constitutes Good Business," by J. B. Bray, service manager for the Grant Motor Car Corporation, Cleveland; "What Is the Most Efficient System of Estimating Charges to Customers for Repairs?" by O. T. Hillshafer, service manager for the Chandler Motor Car Co., Cleveland, and "The Necessity for Instituting an Educational Programme Emphasizing the Responsibility of Vehicle Users as Regards Care and Operation," by A. B. Cumner, service manager for the Autocar Co., Ardmore, Pa.

Government Wants Cooperation.

In addition to this there was a very interesting address by Maj. R. A. Osmun of the Motor Transport Corps, U. S. A., in which he stated that the object of his attendance was to ascertain for the information of the War Department to what extent the Motor Transport Corps could rely upon the industry as a whole and the service organizations of the different manufacturing concerns in the event of national need.

First of all the Motor Transport Corps must maintain an organization which will be the nucleus of what can be developed with extreme rapidity should there ever be need for mobilizing the military resources for defense or offense, and with the experience gained by the European war the government sought to determine precisely what cooperation could be obtained and what was necessary to insure supplies of materials for maintenance of vehicles and vehicle

equipment, and to learn to what degree the Motor Transport Corps could depend upon the service departments training and fitting men for the different works that would be necessary for the operation and maintenance of this division of the military establishment of the army.

Four Motor Transport Corps Schools.

Major Osmun stated that the purpose of the Motor Transport Corps was to establish and operate four principal schools for the training of officers, selected non-commissioned officers and enlisted specialists in the technique of motor transportation and the efficient operation of men in the field, and to develop and standardize the instruction and training of officers and enlisted men in the organization.

The courses for the officers will be 16 weeks, for the non-commissioned officers and for the drivers eight weeks, and for the enlisted specialists 16 weeks. The courses will be intensive and will be designed to train the men for the special work required of them.

A great deal of the general plan or policy of operating of the Motor Transport Corps was dependent upon knowledge of the men who might be obtained in an emergency to bring this branch of the service up to the standard and specific information of their training and the work for which they would be qualified. If the service departments of the different factories could undertake to train men to do work that would be necessary in the Motor Transport Corps, so that they would be efficient factory workers and at the same time qualified for the needs of the army, this cooperation would go a long way towards establishing a reserve that would be greatly relied upon by the government.

One object of Maj. Osmun's attendance was to present to the service managers the policy of the War Department and to learn first handed whether or not that policy was well founded after careful consideration of the possibilities of the factory organizations undertaking to train men to military requirements and standards.

Need of Uniform Nomenclature.

Another factor of prime importance was the use of uniform nomenclature so that there would be no delays or confusion incident to requisitions for parts or essentials incidental to maintenance. Were there uniformity of service department organization there would be no possibility of error, and were there variance in industrial practise this could only be compensated by exact knowledge of the manner of operating each service department, especially with reference to the distribution of parts.

Following the papers there was discussion of "Should Service Be Rendered Directly to Cars Owned in Territory Adjacent to the Factory?" and "Should Factory Discount on Parts Cover Distributor's Profit Without Necessitating Adding Handling Charges by Distributor to Car Owner and Dealer?" and a diversity of other similar subjects that were brought up through questions which were asked by the speakers.

During the course of the sessions General Manager Reeves of the National Automobile Chamber of Commerce made numerous statements relative to policies of the chamber, interpretation of revenue law decisions with reference to excise taxes, and the final disposition of the proposal to distribute trucks to the different governmental, state and municipal departments, which had been awaiting a legal interpretation of the bills which authorized distribution.

The third day was devoted by the visitors to tours of inspection of some of the factories of Detroit, there being four groups that had option of visiting four of the plants, two in the morning and two in the afternoon. The works visited were the Hudson Motor Car-Essex Motors and Chalmers Motor Car, Packard Motor Car and Dodge Bros., Federal Motor Truck and Michigan Auto School, and the Ford Motor and Cadillac Motor Car.

CALENDAR

- Nov. 27—Los Angeles, Cal., races, Ascot Speedway.
- Dec. 3-5—Cleveland, O., annual convention, Automobile Trade association.
- Dec. 4-6—Chicago, Ill., show, Motor Transport Corps.
- Dec. 19—Detroit, Mich., meeting Society Automotive Engineers, Hotel Ponchartrain.
- Dec. 20—Los Angeles, Cal., races, Ascot Speedway.
- Dec. 27-Jan. 4—Akron, O., automobile show, Central Garage.
- 1920.
- Jan. 3-10—New York, passenger car show, National Automobile Chamber of Commerce, Grand Central Palace.
- Jan. 3-10—New York, exhibition of commercial cars and accessories, Eighth Coast Artillery Armory.
- Jan. 8-15—Chicago, Ill., aircraft exposition.
- Jan. 10-17—Philadelphia, Pa., 19th annual automobile show, Commercial Museum building.
- Jan. 17-24—Cleveland, O., 19th annual show, Cleveland Automobile Manufacturers' and Dealers' association, Wigmore coliseum.
- Jan. 21-25—Spokane, Wash., automotive show, Spokane Dealers' association.
- Jan. 24-31—Chicago, Ill., show, National Automobile Chamber of Commerce, passenger cars, Coliseum; trucks, Drexel pavilion.
- Jan. 24-31—Chicago, Ill., exhibition, commercial cars and accessories, International Amphitheater.
- Jan. 26-31—Amsterdam, N. Y., automobile show, benefit of Company H, New York State Armory.
- Feb. 9-13—Louisville, Ky., 17th annual convention, Road Builders' association.
- Feb. 9-13—Louisville, Ky., 10th American Good Roads Congress.
- Feb. 9-13—Louisville, Ky., 11th annual Good Roads show.
- Feb. 9-14—Greenville, Mass., automobile show, benefit Company A, Massachusetts State Armory.

- Feb. 9-14—Nashville, Tenn., annual show, Nashville Auto Trade association.
- Feb. 23-28—Louisville, Ky., 12th annual exhibition, Louisville Automobile Dealers' Association, First Regiment Armory.
- Feb. 23-28—Pittsfield, Mass., automobile show, benefit Company F, Massachusetts State Armory.
- Feb. 24-March 1—Kansas City, Mo., show of passenger cars, trucks and accessories, Motor Car Dealers' association, Convention hall.
- March 1-6—Buffalo, N. Y., 18th annual automobile show, Buffalo Automobile Dealers' association, Broadway auditorium.
- March 13-20—Boston, Mass., automobile, truck and accessory show, Mechanics' building.
- May 15-20—San Francisco, Cal., seventh annual foreign trade convention.

Foreign.

- December—Brussels, Belgium, International Automobile Manufacturers' Congress.
- Dec. 19-Jan. 4—Paris, France, International Aviation exhibition.
- January, 1920—Glasgow, Scotland, Scottish Motor exhibition.
- Jan. 10-18—Brussels, Belgium, motor car show.
- Feb. 21-28—Ottawa, Ont., Canada, motor show.
- Feb. 23-March 6—Birmingham, England, British Industries fair.
- March—London, England, Motor Boat, Marine and Stationary Engine exhibition.
- March—Adelaide, Australia, All Australian exhibition of motor vehicles, airplanes, engines and automotive equipment.
- March 1-15—Lyons, France, automobile show.
- March and April—Pretoria, South Africa, South African Products exposition; overseas motor vehicles specially featured.

PROFITEERING IN BRITISH CARS.

An effort to break up profiteering in automobiles is being made by the British Motor Trades Association and the Motor Agents' Union. Heavy fines have been imposed in cases where agents have advanced the prices fixed by the manufacturers. If the dealer refuses to pay the fine he is cut off from all source of replenishing his stock.

Another form of profiteering in cars is often encouraged by private autoists. On receiving a new car the owner in many cases has resold it to a second hand dealer and pocketed an immediate profit of \$500 or more. Such is the demand for cars that the second hand dealer has no difficulty in disposing of the car at another \$500 profit for himself.

Owing to the shortage of cars every dealer has a long list of expectant purchasers and attempts have been made to bribe salesmen to shift the names of waiting customers from the bottom to the top of the list. In one instance reported to the Motor Agents' Union the bribe offered a salesman was \$750.

How to Plan for Drive-In Filling Station

By F. A. Bean, Consulting Engineer, Wayne Oil Tank & Pump Co.

THOSE of you who have watched the growth of the Drive-In Filling Station during the comparatively brief years of its existence, must realize that it has become an all important factor in our commercial life for the retail marketing of gasoline, automobile lubricating oils and greases, and in some instances kerosene.

These stations range from the lean-to type, on an unkept piece of land, to those that are almost palatial in their architectural design and furnishings, with natural decorative efforts that are worthy of our best landscape engineers and a cost running into the tens of thousands of dollars.

Nearly all the larger cities possess a fair quota of stations, while there is a proportionate number in a great many of our smaller cities, including those of 1000 population.

The first drive-in filling station was built in the middle west in the last decade. There are no accurate figures available at the present time to show the number of stations now in operation. One company alone has over 1300 in 11 states and is continually building more. Several other companies have nearly as many. These added to the large number of small companies operating chains of from three to 20 stations and the tremendous number of singly owned stations, should bring total number well over 15,000. Such figures give a rough idea as to the development of the industry during the past few years.

Importance of Planning.

It would also appear at first thought that the field is fairly well covered, however, there are still a great many excellent opportunities in the large cities and hundreds of the smaller places which are without a filling station of any type. It must also be remembered and taken well into account that the field is continually broadening, due to the ever increasing number of passenger automobiles and trucks and the corresponding increase in the sale of gasoline and lubricating oils for their operation.

In this, as well as in every other line of industry, a large number of the stations have proven to be exceptionally

good paying investments, while others have turned out to be flat failures. In each and every case there is a well defined reason for the success or failure of a station. A small proportion of the failures is the result of mismanagement in operation, but a careful analysis of all of the stations examined, reveals the fact that in a majority of cases they were not properly planned at the outset.

It is therefore perfectly safe to say that the success of any station, expressed in terms of dollars and cents, is dependent on its being so planned as to attract and efficiently hold and serve a maximum gallonage at a minimum cost of operation and maintenance. To this, of course, must be added the exercising of a sound business judgment in its management.

be well kept in mind and that is the operation of a filling station makes you, in a certain degree, a public service corporation and, in order to successfully serve a large and extremely critical automobile public, it will be necessary for you to make your ideas and whims, in a proportionate degree, subservient to theirs. I do not mean by this that you are to allow the automobile driving public to dictate your business policy or manage your business entirely. Use a little applied psychology. Let them believe they are doing it.

In order to produce a successful station the local conditions under which it is to be operated should be carefully studied and the station building and its surrounding layout designed to meet these requirements, as no one station or single combination of ideas can be expected to serve all sorts of service and conditions.

A refinement, not possible in the investigation, is the working out of all factors for readily judging how closely any particular station approaches the ideal. Much can be done, however, with the data available by a comparison of the future in relation to the chief factors affecting sales, which are population and its density, per capita car ownership of the district, size and location of the lot,



Gasoline and Oil Station Operated by Pretty Girls in Winnipeg, Canada.

First of all decide just what you want or rather what you need. It is much easier to work this problem out in the first stages of the game than to rush in blindly and complete the job, then discover that you know what you positively don't want, and, at the same time, have it on your hands.

The embryonic operator (in some cases the old timer as well) in his efforts to spread his small wealth into as much station material as possible is likely to overlook a number of important details which seem innocent in themselves, but which have a peculiar way of piling up, and at the grand reckoning of cost and result, assume the proportions of a great big jolt. It is those little bumps that I propose to try and clear away from the path of those who expect to build and operate new stations.

There is one thought that must always

arrangement of drives, type of building, class and distribution of the equipment, general appearance, operating methods, present and probable future competition.

Statistics which have been compiled by some of the larger companies are not only interesting, but are well worth serious study. A report recently made public by the National Automobile Chamber of Commerce gives the number of cars of all types now in use as 5,945,422. This makes approximately one automobile to each 20 inhabitants of the United States.

Using the law of averages, based on mileage, a station located in a town of 1000 inhabitants and controlling one-half of the gasoline (on a two-cent margin) and lubricating oil used by the automobiles in the town, should pay a net profit of eight per cent. on the original investment of \$4000, and which takes into account, interest on capital invested, all



Station at 39th and Farnum Streets, Omaha, Neb.

operating and maintenance charges, depreciation, etc.

This is a safe minimum earning rate for towns of this class and similar deductions can readily be made for towns and cities of larger populations by a careful study of the factors entering into that particular locality.

General Location.

The records of one company prove quite conclusively that the station located in a fairly well settled residence district where practically every house, for a radius of 10 or 12 blocks from the station, owns a car and keeps such car in a private garage instead of a public garage, is a better paying station as far as daily average sales are concerned than station which is located in the heart of the business district on a heavily traveled highway or boulevard where practically all of the sales are of a transient nature. In other words, the station located where community purchases are certain is practically assured success.

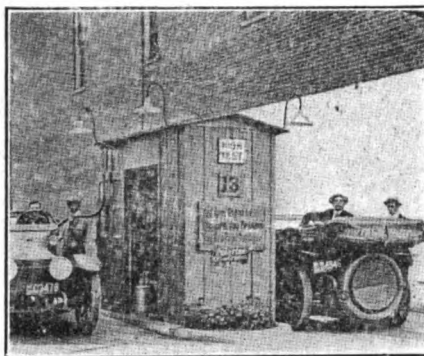
I have in mind one station located in a district similar to that described above and inhabited by the so-called middle class, owning medium or low priced cars, which were in daily use the year round for business or pleasure, and which had 532 regular customers who came on an average of three times a week, six months after the station was opened for business, and all lived within a radius of eight blocks of the station and constituted over 85 per cent. of the cars in that territory. Transients very seldom drove into this station. Of course stations of this type are subject to rush periods and provision must be made to care for the rush in the way of extra pumps, large, roomy drives and ample attendants.

At another station located on one of the prominent boulevards in Chicago, where every day in the year between the hours of 8 in the morning and 10 o'clock at night, over 600 cars passed the station every hour, and it was found that only about two per cent. of them drove in. It was also ascertained that only occasionally the same car came more often than once a week.

Now do not be misled and think that

the station last described does not pay. They do. Hundreds of them are paying splendid returns on the investment. These cases have been cited simply for the sake of comparison and the comparisons are good averages.

When locating on a boulevard or rather heavy traffic highway, care should be taken to get on the side of the burden of



Pat. Toal, Inc., Buffalo, N. Y.

traffic, particularly if the station is all hidden from approaching cars. Comparatively few drivers will cross the street through heavy traffic in order to get into a filling station unless it is a case of necessity.

Stations located in the center of business districts are in a class similar to those on the boulevards, unless they are

located near or adjacent to a large public parking space, or on a lot large enough to provide such parking space. Under these circumstances they may become something of a community purchasing point.

Stations located near amusement or public parks, ball parks, or at the outskirts of towns or resorts of any nature, or on tourists' highways, cannot expect to have a good daily average of sales, as a general thing, but will be subject to peak load periods and then dwindle to periods of practically nothing.

Stations located on prominent streets near the approach to large railway stations, or near the approach of a well traveled bridge, usually command a good business better than those located near large theaters or hotels.

Stations catering to trucks should be easy of access immediately before they pick up their loads or immediately after they have discharged them. They will seldom pay if located along the route of the loaded trucks.

Selection of the Lot.

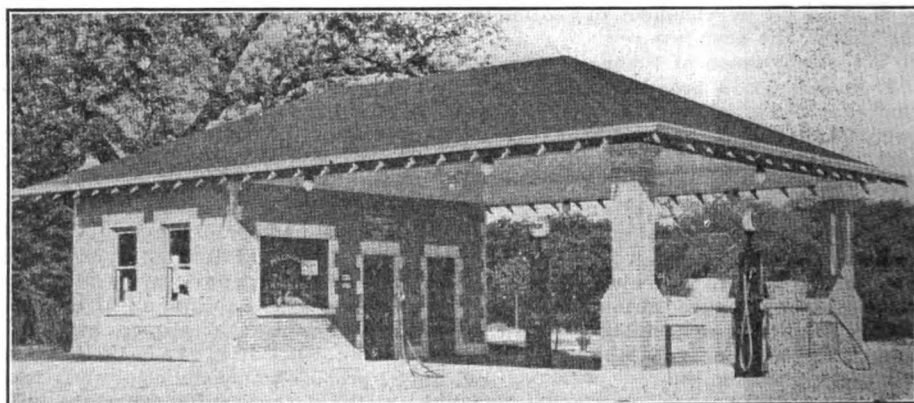
After having decided that any particular locality will produce enough business to make a station a paying proposition, the next step is the choice of a lot.

Corner lots are always more desirable than inside lots. They are almost absolutely essential on boulevards and other places of congested traffic in order for cars to get in and out without danger of damage or an accident. Another strong point in their favor is that they are very seldom shut in from view and can be seen by approaching cars for several hundred feet.

A driver will very seldom turn in unless he sees the station some distance before he reaches it, unless his supply of gasoline is almost depleted. Corner lots are also susceptible to a better driveway arrangement for the rapid handling of business during the rush hour periods, if they are of reasonably good size.

Inside lots can be used to good advantage in residence and business districts if of sufficient size so as to allow a proper driveway arrangement. Keep away as much as possible from narrow or unpaved streets or streets on which street cars or other tracks are located.

One city of about 500,000 recently denied permits to build several filling stations, giving the reason that the locations were on streets through which trolley lines operated and were so narrow as to



An Attractive Type of Filling Station.

greatly increase the liability of accidents. It can be readily seen that drivers are going to hesitate before patronizing stations in this manner.

The board of safety of one city has held that there should be at least 18 feet between the nearest car rail and curb to allow automobiles to turn in and out of private property without danger. Avoid lots that are more than four feet above the level of the street or that are located on or at the foot of a steep grade.

Triangular lots when not too narrow usually make very good station sites. In casting about for locations, don't confine yourself to vacant property. It often occurs that existing structures can be razed at a small expense and a very desirable location thus secured.

Size of Lot.

The size of the lot is always a question. It depends largely on what can be secured. The price asked and the number of cars that must be served. I would strongly urge to refrain from entering a locality the property of which is not large enough to properly build on and not adequate for successful operation.

Perhaps the simplest method would be to give the minimum size of a few lots which have been found to work out to good advantage.

Inside lots facing on one street only should have a frontage of at least 100 feet and a depth of 50 feet.

Inside lots, with a frontage on two streets (that is running clear through the block) should have a minimum width of 50 feet. Stations located on this class of a lot very seldom become large steady gallonage stations unless situated so that they are not obstructed from view by buildings on either side or can be made community purchase points.

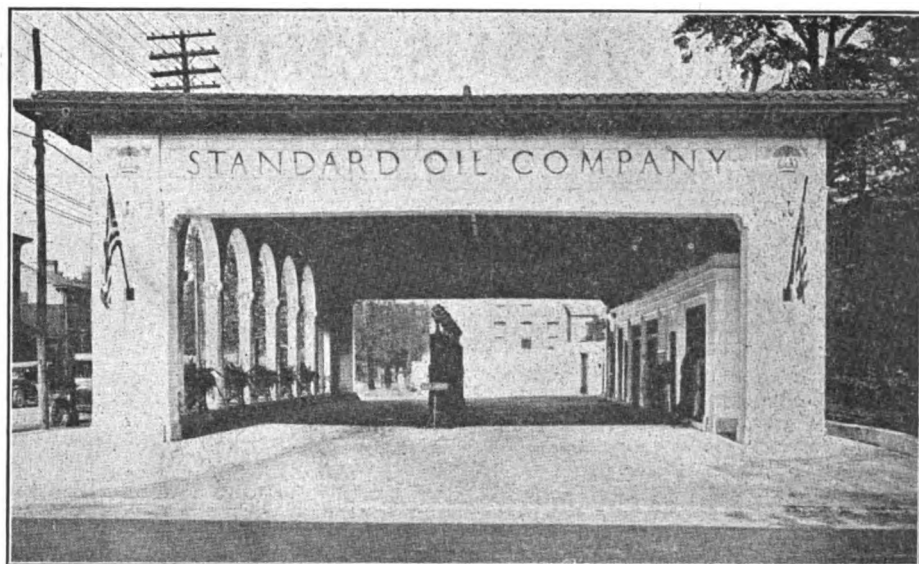
Corner Lots.

Corner lots for small gallonage stations (500 to 600 gallons per day) should have a minimum of 50 feet frontage on each street, providing the streets are fairly wide and without street car tracks. Where stations are doing a larger business, these frontages should range from 80 to 100 feet, especially where traffic is heavy or inclined to become congested.

The above dimensions are for stations handling gasoline and lubricating oil only. If tires or other accessories are to be handled, at least 20 feet should be added to the width in every case.

When triangular lots are used they should be at least 100 feet in depth by 50 feet across the back.

Remember these are all minimum di-



Beautiful Service Station in Louisville, Ky.

mensions and can usually be greatly increased to good advantage.

One of the best arranged and largest gallonage stations, which has come under my observation, is located close to the center of a city of the half million class and occupies an entire block approximately 250 feet square, with driveway entrances from all streets.



Station in Oklahoma City, Okla.

Although this station is of an unusually expensive type, it is paying over 50% on the investment.

Leases.

Some oil companies will build stations only where they own the property. It certainly does not pay to build on a lot where the lease is less than five years, although some of the larger companies attempt it on a three-year lease. You can salvage practically nothing from the cost of the building (except the portable

type), piping, driveways, landscape improvements, etc., and you cannot afford to build in a manner permanent enough to attract and serve a maximum gallonage and then send practically all of it to the scrap heap at the expiration of two or three years.

Renewal Privilege.

I believe that in a locality where the prospects look reasonably good, it is the best policy to secure a five or 10-year lease, with a privilege of renewal and an option to buy.

There are two other clauses that should be incorporated in the lease. The first is that the building and all other improvements are the property of the lessee and may be removed at the expiration of the lease.

The second, that in the event of any existing or future city ordinances, county or state legislation or court decisions which make the property unavailable for filling station use; then the lease shall terminate and become null and void at the option of and without liability for damages on the part of the lessee.

Position of Building.

The placing of the building on the lot is something for which it is impossible to lay down any definite rules.

Surrounding conditions and the proposed method of operation must be carefully studied. The position of the building is dependent on the size and shape of the lot, obstructions to driveway entrances, the width of the streets, grade of streets and lot, whether there are street car tracks or not, and if on a corner, which street carries the burden of traffic.

Accompanying this article are several typical illustrations which may serve in a general way to help you to determine what is best in your own particular case.

Buildings placed in or near the center of the lot and without covered driveways so that cars can be served on all sides are susceptible to handling more cars and handling them more rapidly and more efficiently than when the building is placed close to a lot line.



This Station Has Artistic Appearance.

HUMOROUS SIDE OF MOTORING

FLIVVER VS. MULE.

The question is, which is the better—a good mule or a flivvery flivver?

Down South there's some one who prefers the mule, as indicated by this advertisement in the classified advertising columns of a newspaper:

"Wanted to exchange a ——— automobile, 1918 model, for a good mule."

"We omit the name of the car, not desiring to give it a free advertisement."

SHORT AND SWEET.

To market, to market, to buy a new car.
Home again, home again, jiggytjjar;
To market, to market, to have repairs made,
Home again, home again, jiggety-jade;
To market, to market, to sell at a loss.
Home again, home again, driving the hoss.

ABOLISHING BAD ROADS.

"How are the roads in this section?"
"Fine," replied the farmer. "We've abolished bad roads."

"Big job, wasn't it?"

"Not at all. Wherever the going is especially hard, we don't call it a 'road.' We call it a 'detour.'"—Washington Star.

HOW TO KEEP 'ER.

Peter, Peter, pumpkin eater,
Had a wife and couldn't keep 'er;
He bought a car that swelled her pride.
Now he couldn't lose her if he tried.

PAY-AS-YOU-ENTER.

"Where are you going, my pretty maid?"
"I'm going motoring, sir," she said.
"May I go with you? Now don't be mean."
"You may if you'll pay for the gasoline."

THE MIND OF A MOTORIST.

"What do you regard as the most important of our railroad problems?"

"Beating an express train over a grade crossing," answered Mr. Chuggins.



SAID THE TRAFFIC COP.

William Herschell in Indianapolis News.

"Yes, of course it's all a nuisance,
Traffic rules are pests, I know;
I'd be glad, if I were Captain,
Just to wink and let you go.
But I'm not—I'm just a hireling
With my weary rounds to trudge
It's all right with me—but, brother—
Better go and see the Judge."

"How's that, madam? Ain't it awful?
You just drove your car down town,
Then dropped in to buy a bonnet
And a simple little gown?
In the store just twenty minutes?
Ain't time awful in its flight?
See the Judge tomorrow morning;
Nice young fellow—he's all right."

"O, your watch stopped? Ain't that madd'ning?
Mine stopped, too, the other day,
Nearly made me late to roll call;
Guess I'll give the thing away.
Tell the Judge just how it happened;
Judge is nice—he'll understand.
Tell him you were three hours over—
Blame it on the minute hand."

"Wife forgot to telephone you
Where she'd parked the car?—well,
say,
Ain't that like forgetful women?
Don't they do things just that way?
Well, let's see, how can we fix it?
Say, I'll tell you what to do—
See the Judge tomorrow morning;
He won't do a thing to you."

DANGER WARNING.

Out in New Mexico even public signs come direct to the point. They do not waste any time in wondering how the reader will feel about it.

In a garage at Albuquerque is posted:
"Don't smoke around the tank. If your life isn't worth anything, gasoline is."

THE REAL DIFFICULTY.

An old-fashioned country lady and her son were driving into town in the family buggy when a huge automobile bore down upon them. The horse was badly frightened and began to prance, and the old lady promptly got out and waved wildly to the chauffeur, screaming in her excitement.

The chauffeur stopped the car and offered to help get the horse quiet again. "That's all right," said the boy, who remained composedly in the carriage. "I can manage the horse. You just lead mother past."—Boston Transcript.

LITTLE JACK HORNER.

Little Jack Horner skidded a corner
Driving about in high;
He put on his chains, waved adieu to the rains,
And said, "What a smart boy am I."

HARDLY ENOUGH TO BUY A FLIVVER.

It is said that Blanco Ibanez received only \$300 for "The Four Horsemen of the Apocalypse."—New York Tribune.

MARY'S CAR.

Mary has a little car,
It's color doesn't matter;
And everywhere that Mary goes
You can tell it by the clatter.

A REGULAR FISH.

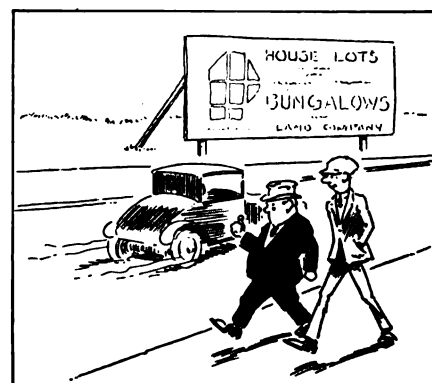
"Is he a man of cool nerves?"
"Very. He can sit in the back seat of an automobile and let his wife do the driving and never once offer a suggestion."—Detroit Free Press.

SPITEFUL.

"Young Jobbles has bought a rakish roadster. It's spite work, I fear."

"How so?"

"The money spent for that car was intended for a bungalow. Young Jobbles wants to show the girl in the case that he has no intention of proposing a second time."—Answers.



Durant Has Made Great Success of General Motors

Investment of \$5000 Five Years Ago in This Corporation Would Be Worth Approximately \$300,000 Now, Exclusive of the Dividends.

THANKS principally to William C. Durant, the General Motors Corporation has proved a veritable gold mine for those who bought the stock when it was selling at a low price. In 1914 General Motors sold as low as \$25 a share, and an investment of \$5000 at that time would be worth approximately \$300,000 now, simply in stock market appreciation, without taking into account dividends that have been paid.

General Motors stock has been doing some skyrocket stunts lately. There has been a rumor in Wall street that when the capital reorganization takes place and 10 shares of new stock are issued for every one of the existing shares, the new shares will be placed on a two per cent. annual basis.

An idea of the magnitude of the General Motors Corporation is given in the last annual report. The General Motors group comprises the Buick Motor Co. Division, Flint, Mich.; Cadillac Motor Car Co. Division, Detroit; Central Forge Co. Division, Pontiac, Mich.; Jackson Church-Wilcox Co. Division, Saginaw, Mich.; Northway Motor and Manufacturing Co. Division, Detroit; Oakland Motor Car Division, Pontiac; Olds Motor Works Division, Lansing, Mich.; Samson Tractor Co. Division, Janesville, Wis.; Scripps-Booth Corporation, Detroit; Champion Ignition Co., Flint, Mich.; the McLaughlin Carriage Co., Ltd., Oshawa, Ont.; the McLaughlin Motor Car Co., Ltd., Oshawa, Ont.; General Motors Ex-

port Co., New York; General Motors (Europe) Ltd., London, England, and Janesville Machine Co., Janesville, Wis.

The Chevrolet group comprises the Chevrolet Motor Co. of Michigan, Flint, Mich.; Chevrolet Motor Co. of New York, Inc., Tarrytown, N. Y.; Chevrolet Motor

The United Motors group includes the Dayton Engineering Laboratories Co., Dayton, O.; Hyatt Roller Bearings Division, Newark, N. J.; Jaxon Steel Products Division, Jackson, Mich.; Remy Electric Division, Anderson, Ind.; Harrison Radiator Corporation, Lockport, N. Y.; New Departure Manufacturing Co., Bristol, Conn., and the Lancaster Steel Products Co., Lancaster, Pa.

Recently General Motors made an offer for the purchase of the control of the Fisher Body Corporation.

Mr. Durant founded the General Motors Corporation, but in 1910 was ousted from its management. He was restored to its management six years afterward. Because of his brilliant success in handling the affairs of the company he has become a tremendous figure in the automotive world. One writer stated that Mr. Durant's "imagination and organizing genius have made him to the automobile industry what Carnegie was to steel."

Wall Street never was able to understand Mr. Durant. For years it misjudged him, but he has triumphed over those in the "Street" who opposed him. He was born in Boston, Dec. 8, 1861, of

Pilgrim Father stock. His mother was a daughter of H. H. Capro, war governor of Michigan. He was nine years old when his parents took him to Flint, the city he has made one of the great American hives of industry and prosperity.

When he was 17 he went into his grandfather's lumber mill and labored



William C. Durant, President of General Motors Corporation.

Co. of Texas, Fort Worth, Tex.; Chevrolet Motor Co. of St. Louis, St. Louis, Mo.; Chevrolet Motor Co. of Canada, Ltd., Oshawa, Ont.; Chevrolet Motor Co. of Bay City, Bay City, Mich.; St. Louis Manufacturing Corporation, St. Louis, Mo., and the Toledo-Chevrolet Co., Toledo, O.

there four years. When he was 21 the reorganization of a small company that was in a bad way financially was given to him, and he put it on its feet. In 1886 he founded the Durant-Dort Carriage Co., which eventually made 150,000 vehicles a year.

The first automobiles greatly interested him and he saw that they would replace the horse. A Mr. Buick had a gasoline engine designed for farm work. Durant adapted it for automobile use and the Buick company was born.

In 1907, when the nation was in the throes of a panic, Durant constructed the great plant of the Buick company at Flint. Again, after the armistice, when men hesitated to plan any building, Durant startled the business world with an announcement of a vast building programme for General Motors.

FORD INVENTS FAST MOTOR STREET CAR.

An internal combustion engine to be used on street railway cars, upon which Henry Ford has been working for several months, and with which he expects to revolutionize transportation by the street railway and interurban routes, recently had its first tryout in the Ford experimental shops at Dearborn, Mich. Both Mr. Ford and his general manager, Charles E. Sorensen, said they were delighted with the tests and confident that their conservative estimates as to power and speed will be considerably exceeded. The power unit that moves the car also compresses the air for the brakes and generates electric current for the lighting and signal system, while a fan, bolted to the front end of the starter, draws air in through the housing of the motor, where it is heated and then exhausted through heating pipes to warm the car. The car can make 70 miles an hour and there is a 75 per cent. reduction in rate as compared with the power and control equipment of the ordinary electric car.

STORING A JACK IN A TOOL BOX.

The jack is probably the most awkward tool of the car's equipment to store. If laid in the tool box loosely it will strike other tools at every uneven spot in the road and cause noise. Extra tubes coming in contact with jack will be ruined.

Wrap the jack in a cloth and lay it on the bottom of the tool box. The wrapping will cushion it from the box and other tools or tubes. Some drivers strap a jack to the running board or other accessible place on the car where it may be reached when wanted.

ARMY CAR SALES.

The Motor Transport has sold through public auctions 1800 motor vehicles unserviceable for government use. On Nov. 10 these sales will take place: Chapman Field, Fla., touring cars and trucks; Fort Bayard, N. M., touring cars and trucks; Camp Dodge, Ia., one ambulance, one truck, motorcycle and side car.

Former Auto Mechanic Creates Business for Himself

J. H. STALEY, president of the Continental Auto Parts Co., was formerly a garage mechanic. He became impressed with the lack of system prevailing in most garages and repair shops and based on his own practical experience in repair shop problems, he designed and built a number of time saving devices which gave him quite a local reputation as an inventor.



J. H. Staley, President Continental Auto Parts Co.

A few years ago he gave up repairing automobiles and got in business for himself, manufacturing and selling repair shop and factory equipment. Always a close student of shop and factory efficiency, he saw many opportunities to broaden his line with newer and better devices for which he found an increasing demand.

During the war, Continental motor stands were used in every Liberty Motor manufacturing plant and repair depot. With the signing of the armistice the return of thousands of army mechanics produced such a flood of shop equipment business that the Knightstown plant was soon swamped with orders.

The recent move to Columbus, Ind., gives the greatly enlarged Continental factory force ample room in which to increase production, catch up with orders and go after new business on a much larger scale.

LYONS FAIR.

The spring term of the Lyons Fair will be held in Lyons, France, March 1-15. Motors of every kind are to be a feature. The rental of a booth is 800 francs. An advance catalogue will be issued one month prior to the opening of the fair. American exhibitors who desire to have

their exhibits listed in this catalogue must have their applications and checks at the office of the Lyons Fair, 3 Park Row, New York, before Nov. 24. Exhibits must be in the hands of the American Express Co., 65 Broadway, New York, before Jan. 15. Exhibitors not desiring their names in the advance catalogue have until Dec. 31 to file applications. Additional data may be obtained from the Lyons Fair office.

OVERSIZE TIRE TABLE.

Oversize tires, designed primarily for exceptional and hard service, have come into general favor among owners of medium and large capacity passenger cars because of their extra strength, easier riding cushion and the longer mileage that can be expected of them. They are popular also because, in the opinion of many owners, they add to the appearance of the car.

Some users of oversize tires think that a tire with increased cross section diameter, but with no increase of diameter measured through the hub from outer edge to outer edge of tire, is an oversize. This is a mistake. In other words, if the regular size tire is 34x4, the oversize is not 34x4½, but 35x4½. Both diameters must be increased or the bead will be strained in putting the tire on the rim.

Firestone gives the following table to show the proper regular and oversize tire for a given rim:

Rim.	Regular Tire.	Oversize Tire.
28x3	28x3	29x3½
30x3	30x3	31x3½
30x3½	30x3½	31x4
32x3½	32x3½	33x4
32x4	32x4	33x4½
34x4	34x4	35x4½
32x4½	32x4½	33x5
34x4½	34x4½	35x5
36x4½	36x4½	37x5

The government standard oversize scale, which has been adopted by tire manufacturers, sets a maximum and minimum air capacity for each oversize. The table given above applies to those tires which, like Firestones, give the maximum of air capacity for each oversize.

"CROSS AT CROSSINGS" CAMPAIGN IN PHILADELPHIA.

The automobile and truck industry in Philadelphia is taking an unusual interest in the "Cross at Crossings" campaign being conducted by the Rotary Club in the city during the first two weeks in November. E. J. Berlet, president of Stability Motors Co., eastern distributor of Atterbury and Defiance trucks and Westcott passenger cars, is chairman, and Lee J. Eastman, president of Packard Motor Car Co. of Philadelphia is in charge of the motor industry co-operation. There were 2150 persons in Philadelphia injured last year because of their carelessness in crossing streets between blocks and the safety campaign has as its purpose the cutting down of this unusual number of accidents.

Proper Adjustment of Push Rods Matter of Importance

While Work Is Comparatively Simple, Great Care Must Be Taken. It Is Essential That All Rods Have Same Amount of Clearance. Thousandth Part of Inch May Result in Making Great Difference.

WHILE adjustment of the push rods is simple, care must be taken that all the rods have the same amount of clearance, and that this clearance is sufficient to permit of the complete closing of the valves when the motor is well warmed up. Proper adjustment is important in the efficient operation of the engine, and the thousandth part of an inch may make considerable difference.

Under no condition should the push rods be adjusted too tightly; it would be better to leave them loose. With the proper precaution they may be regulated to have the exact amount of clearance. This clearance is between the ends of the valve stems and the rocker arms, which open and close the valves as the push rods are moved up and down by the camshaft.

Allows for Expansion.

The purpose of this clearance is to allow for the expansion of the steel when heated, and there must be allowed sufficient clearance to make certain that the valves will close perfectly under all conditions. As the expansion takes place when warm, the adjustment should be made when the motor is well warmed up.

The first thing to do is to make certain that all the valves are clean and properly seated when closed. To clean

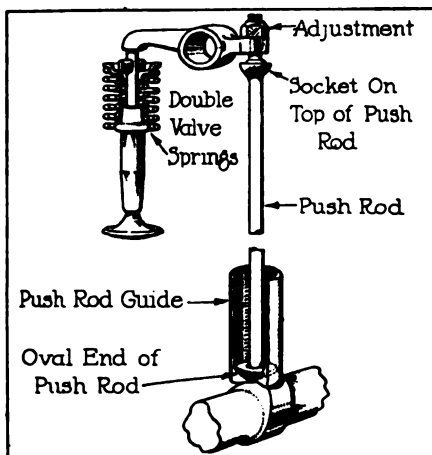


Illustration Shows the Valve and Push Rod Arrangement in the National Sextet Automobile.

valves, place a spoonful of kerosene at the base of each valve stem when the motor is in operation. This will loosen up any carbon that may have collected and have the face of the valve clean.

Now make certain that all rocker arms are well lubricated and operate freely, after which the timing or lashing of the valve lifters should be checked for correctness.

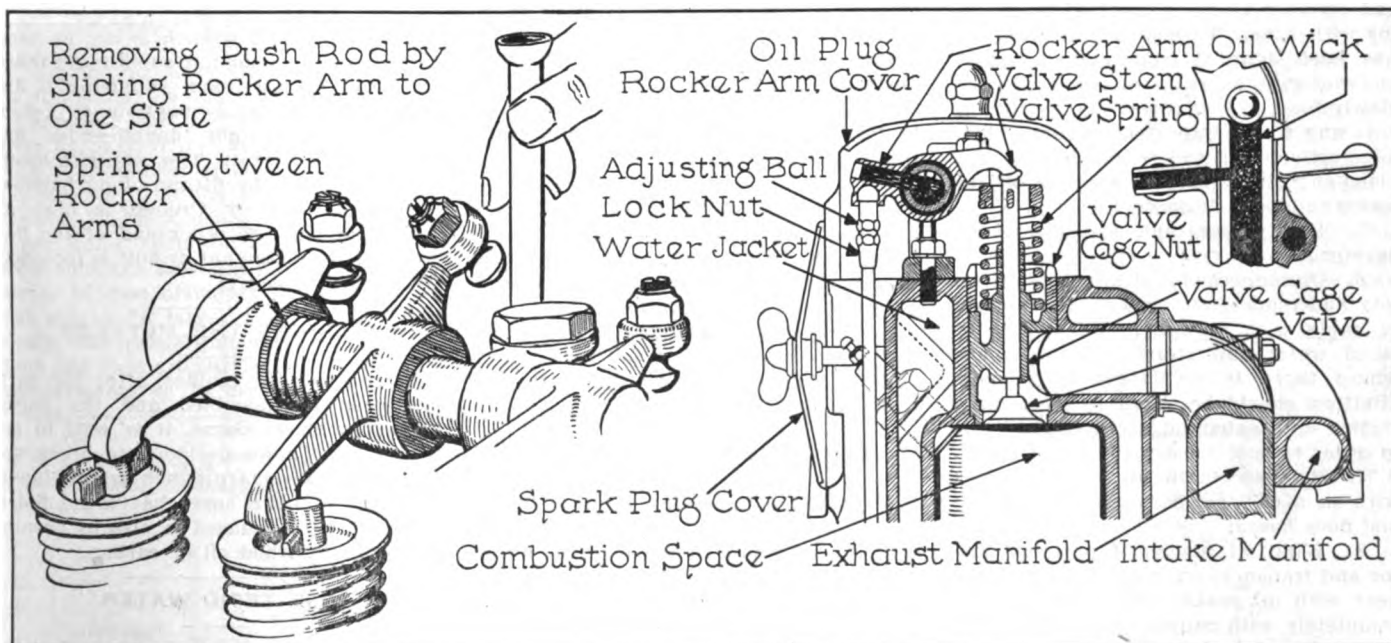
While this process is very simple, first determining the valve is completely closed and then ascertaining the clearance between the top of valve stem and under end of rocker arm, it is advisable to visit the dealer should you wish to have the valve mechanism exactly timed.

Emergency Adjustment.

If compelled to make an emergency adjustment while touring, place the starter in its proper place at the front end of motor, turn to the right or in clockwise direction until both valves in No. 1 cylinder (the one next to the radiator) are closed. Then loosen locking nut on push rod located exactly below the ball or upper end.

Hold push rod firmly and turn ball nut to the right or left as case may require until you can just pass one of your calling cards between the upper end of valve stem and rocker arm. Then hold ball nut firmly in place and turn up lock nut tightly.

When both valves on cylinder No. 1 have been adjusted, turn the motor over and repeat the same operation on No. 2 cylinder and so on until all are adjusted. If the motor is correctly timed and push rods properly adjusted, it will develop the maximum of power. Upon arrival home have your dealer properly time and adjust as suggested.



At Left: Method of Loosening the Rocker Arm for Valve Removal in the National Sextet Engine. At Right: Buick Overhead Valve Mechanism, Showing the Principal Points of Adjustment and Lubrication.

HOW TO PREPARE AUTOMOBILES FOR STORAGE DURING WINTER

FREQUENTLY there are motor car owners who travel to another climate during the winter, or who prefer using closed cars during the cold months, or who, for some reason or other, wish to store their touring models until spring. For such owners the service department of the Liberty Motor Car Co. has prepared the following instructions:

"The prime object to have in mind is protection against cold and dampness, two factors which can do more injury to your car than 20,000 miles of driving.

"The first and obvious thing to do is to look over your garage and see if it is weather proof. If it could be hermetically sealed it would be ideal, but as this is impractical, do the next best and see that all cracks and openings are closed up, doors fit properly and generally prepare it so that your car will be snug and warm as possible. Now as to the preparation of the car itself:

"1. Wash and thoroughly clean the car and jack it up from under the frame. Do this by placing four wooden trestles under the frame, the best points of support being close up against the two front shackle bolt brackets of the front springs. Supporting the chassis in this manner relieves all weight from the springs and wheels.

Remove Tires and Rims.

"2. Remove all tires from the rims and completely exhaust air from the inner tubes and rub them down well with soapstone, sprinkle with French chalk, fold them up perfectly flat, care being taken not to crease them, and place in inner tube bags. The tires should be laid down flat. Store both tires and tubes in a dark place.

"3. Clean and shellac all rims.

"4. Drain off water from the radiator and cylinder block. Flush out the radiator with hose. To insure that all water has been emptied from cylinder block and water pipes, start up motor and run slowly for a few minutes. This will convert any water into steam which might have collected in the water jackets. Replace any plugs removed to drain off the water and close drain cocks.

"5. Empty gas tank and drain carburetor.

"6. Disconnect electrical cables at battery and remove the battery. Smear ends of cable with vaseline. Fill with distilled water and store in a dry place where there is no danger of freezing. (Battery should be taken to a charging station and recharged every two months in order to best preserve it.)

"7. Release clutch by propping open with strip of wood between clutch pedal and floor board.

"8. Wipe all machined parts of motor and transmission, clutch and steering gear with oil soaked rag. Cover motor completely with canvas burlap or an old rug, and replace bonnet.

"9. Oil all steering joints and connections and wrap up with rag.

"10. Fill shackle bolt oil cups with

oil and wrap up with rag. Fill and screw down all grease cups.

"11. Pry open spring leaves and inject graphite and bandage with rag or canvas.

"12. Put the top up and cover the whole car with a dust sheet which will completely cover the car on all sides and attach tape or cords to the ends and tie together underneath the car.

Reminders for Spring.

"Also write the following reminders on a tag and tie to the steering wheel, so that you will be sure to do these things when you want to again drive your car in the spring.

1. Fill radiator with water.
2. See that drain cocks are closed.
3. Empty oil sump and refill with fresh oil.
4. Thoroughly oil and grease as per oiling chart.
5. Refill battery with distilled water and charge.
6. Flush out carburetor with gas.

"If the above features are carefully carried out, you can lock the door of your garage and have the assurance that when the time comes to use your car again it will look and drive as well as the day you put it away."

HINTS FOR CAR OWNERS

ACID PROOF WOOD.

When the storage battery is carried in a wooden box there is always trouble from the acid slopping over and eating the wooden box. Wood may be made proof against acid by painting with a mixture made of six parts wood tar and 12 parts resin. These ingredients are melted together in an iron kettle, after which eight parts of finely powdered brick dust are stirred in. The surfaces are first thoroughly cleaned and then painted with this mixture warm.

AN OBSCURE KNOCK.

A knock difficult to locate is sometimes caused by one of the pistons touching a shoulder in the top of the cylinder, because the packing between cylinder and crankcase has been worn thin. Obviously a thicker packing will cure the trouble.

REMOVING A SEIZED PISTON.

A method of removing a seized piston was recently brought to the writer's attention that was a little out of the ordinary.

The owner in trying to remove the piston had forced it into the cylinder so that the two top rings were in the combustion chamber, which was larger than the cylinder, and as the rings had expanded, removal was impossible. As the cylinder

was old style with a solid head, the only access was through the valve cap openings. The repairer lengthened an ordinary punch by heating and drawing it out. With this punch and a hammer, and by turning the piston with the connecting rod, he found the end of the ring. Tapping the ring lightly with the hammer and punch he forced it partially into its groove. Once started, and by turning the piston and repeating the hammering and pulling on the piston at the same time, he got the ring entirely into the groove and drawing the piston down to the next ring, the operation was repeated and the piston freed from the cylinder.

PRACTISE SHIFTING GEARS OF THE CAR.

When a car is new and the owner not accustomed to driving it, there is often difficulty shifting into intermediate gear, either from low or high. This may be due to a slight dragging of the clutch, or, more often, to the fact that the driver is not familiar with the speed of the engine at which the shifts should be made. A little practise is all that is needed. If rasping the second gear cannot be avoided and it is thought that damage will be done to the gears, avoid shifting from first to second. Accelerate a little more and shift from first to high, and then, at the first opportunity, consult the manager of the service station, who will give you some instruction in correct shifting.

TESTING FOR SHORTS IN A LIGHTING SYSTEM.

When the switch is open and sparks are seen upon disconnecting and touching lead wires, there is a short somewhere along the line. By repeating this test in different places it is possible to locate the short.

LOOSENING UNHANDY NUTS.

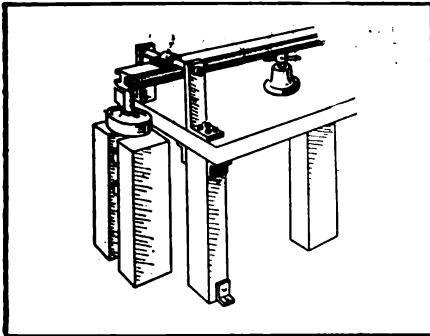
When a socket wrench is not at hand to remove a bolt or nut so situated there is little or no room to swing a flat wrench, it is usually possible to loosen it with a straight double-ended flat wrench as a socket. The requisite leverage is obtained by fitting a long handled wrench—a monkey wrench is best—at right angle to the other end of the flat wrench. Once the nut or bolt is loosened its removal is easy.

CLEANING THE MUFFLER.

In cleaning the muffler, after the part has been disassembled and the parts cleaned with kerosene, it is well to go over all the holes designed to break up the gas with a sharp punch or fine taper reamer, to make sure that these holes have not been reduced in size by accumulations of burned oil or carbon.

USE TEPID WATER.

Hot water has a deteriorating effect on the varnished surface of a well finished automobile body. Tepid water is ideal, although cool water will not harm.



Home-Made Lever Press.

HOME-MADE LEVER PRESS.

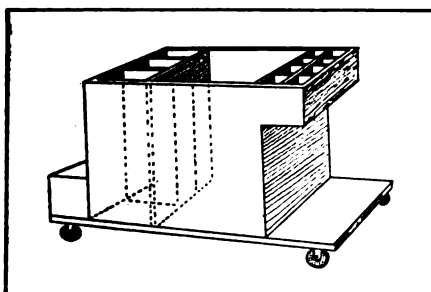
A handy lever press for a small repair shop is made as follows: Secure a length of street car rail from a junk dealer and a short piece of shaft. A heavy plank bench should be built with stout legs that may be fastened to the floor. Brackets are made from four-inch iron, heated in a forge and bent at right angle. Four holes are drilled in the end of the iron for fastening to the bench and a single hole drilled in the other end for the short shaft.

Two brackets will be needed, one at each side. A bearing is made from a strip of iron, shaped to the shaft, by heating in the forge. Holes are drilled at each end to attach it to the rail, and corresponding holes drilled in the rail.

The device is assembled as shown in the cut, using a screw jack of small size for gaining the leverage. The work is raised or lowered by using blocks of different heights and it has been found that this device will take care of practically all of the work that will come to the small shop, such as pressing off gears, pulleys, etc.

TRAVELING PARTS BOX.

"A place for everything and everything in its place" is most important when overhauling the car, and this idea can best be carried out by providing a box with suitable compartments and mounted on casters. The box shown in the illustration has a space in the center for large units such as wheels, radiators, axle housings and the like. There is a series of compartments for small parts, and spaces for larger units, such as axle shafts and steering gear parts. The pistons and rods are carried at one end and the cylinders at the other.



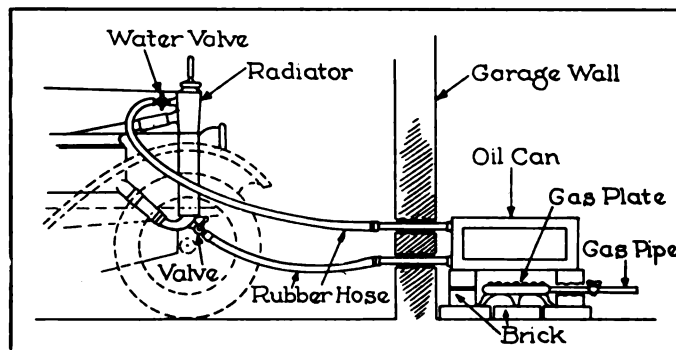
Traveling Parts Box.

GAS HEATER FOR THE GARAGE.

A novel gas heater for a garage recently brought to the writer's attention is so simple in construction, and the owner declared it intensely practical, that it is given to Journal readers for what it is worth.

The outfit consists of a small box or house close to the rear of a garage in which an ovenlike structure of fire brick was placed on the ground to surround a burner, raised to clear the ground. A four-inch gas burner was placed in the center of the oven and connected through a shut off valve to the gas supply of the house lighting system. Over the burner was placed a two-gallon gasoline or oil can, setting on the brick sides of the oven and clearing the burner three or four inches. Two $\frac{3}{4}$ -inch pipes were run from the side of the can through the wall of the garage, one pipe above the other. The pipes were coupled to the can by soldering on it brass nipples.

In the garage rubber tubing, $\frac{1}{2}$ inch bore, lead from the pipes to the radiator of a car, the lower tubing connected to the drain out petcock and the upper tube



Gas Heater for Garage.

is carried in an easy curve to a petcock soldered at the top of the radiator inside.

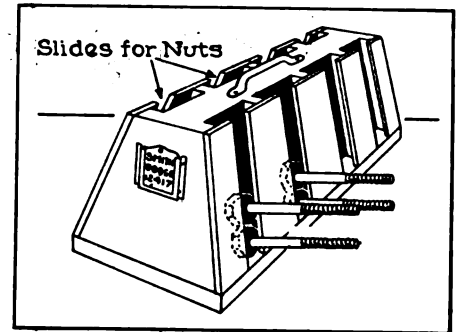
When the car is run into the garage at night the lengths of hose are connected at the top and bottom of the radiator, the petcocks opened and the gas lighted at the burner. The water will heat in the tank and a circulation will be started through the radiator that will keep the water warm and the car ready for use at a moment's notice.

The dimensions of the parts used may be of interest, and are as follows: Gas ring, four inches diameter; gasoline or oil tank, two gallons (heating tank); iron pipe, $\frac{3}{4}$ inch; hose pipe, $\frac{1}{2}$ inch; gas taps of ordinary brass pattern, $\frac{3}{8}$ inch clear bore.

The heating effect is easily under control and the only care necessary is to see that the tank of the radiator is kept full, and that the upper pipe slopes gradually upwards, and does not sag anywhere, otherwise air or steam locks may stop circulation.

NUT AND BOLT RACK.

A unique device for holding nuts and bolts removed from an engine during overhauling is made from a wooden block somewhat wider at the bottom than at



Nut and Bolt Rack.

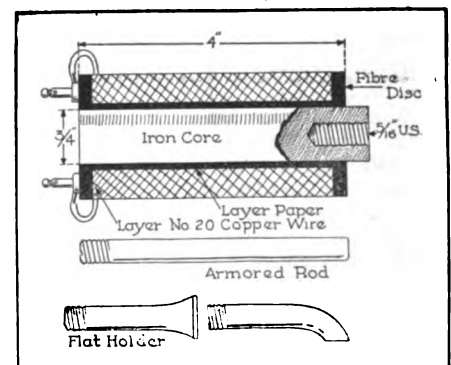
the top, and about 18 inches long, although the length may be varied to suit the individual needs. Slots are cut in the sides of varying widths to take various sizes of nuts and bolts and strips of either light wood or strips of metal were screwed to the slots, partially covering them. Space is left between the strips for the insertion of bolts and nuts. The grooves will be T shape and the head of the bolts are inserted in the grooves with the ends sticking out.

The bottom of the block is covered with a section of board so that the nuts and bolts are retained in the grooves. A small clip or card holder is attached at the end, showing the repairer's name, the car worked on and the job number. Several of these blocks will be required in a garage doing considerable repair work, so that the nuts and bolts of each job may be kept separate.

A handle is attached to the top of block for carrying about the shop.

PICK-UP-MAGNET.

A magnet is handy to remove iron and steel parts from places inaccessible with the hand, especially an electric magnet, because of its greater attraction. In the magnet illustrated a $\frac{3}{4}$ -inch soft iron core four inches long is wound with six layers of No. 20 cotton covered wire. The terminals are brought out at one end and at the other there is a $\frac{5}{16}$ -inch tapped hole for the insertion of various types of rods to aid in reaching out-of-the-way corners. A six-volt storage battery may be used as the source of current supply. Be certain the rods used for the handles are insulated.



Pick-Up Magnet.

Caring for the Storage Battery

CONSIDERING the abuse and neglect that a battery often receives, it is remarkable that it continues to function properly. When trouble results it is usually due to the forgetfulness of the driver in attending to the simple things necessary to the life of the battery.

Should the owner neglect to keep the motor supplied with sufficient oil he is not surprised if it fails to run smoothly. He knows that lack of water in the radiator, for instance, means an overheated motor. And yet, states the Buick bulletin, there are owners who, particularly careful about motor lubrication, abuse their batteries.

Storage batteries, after all, are like human beings. They are chemical—not mechanical. Their elements undergo a constant change. They can suffer from neglect, starvation, overwork, overheating and overfeeding. The crucial period of their lives is in early life.

Heart of Electric System.

The storage battery is the heart of the electric system. It is the reservoir into which the electrical energy made by the generator is stored for ignition, lighting and cranking the motor.

And, as its life depends on the care it receives, it should be the duty of every owner to see that his storage battery is in the best of condition at all times. By observing simple rules he can assure himself that his battery is serviceable and dependable.

Always keep the battery cells filled with distilled water to a level one-half inch above the top of the plates. Never fill the cells full. Look into all cells frequently, just as you do your radiator. A battery cannot be filled and then expected to function indefinitely without further attention. The filling should be done frequently rather than on specific dates because the evaporation of the liquid is affected both by atmospheric conditions and driving.

Without water the plates become hard and are rapidly overheated by the charging current. Filling the battery too full, however, is as unwarranted as not filling it full enough. Too much water makes the acid overflow and eat away the wood case. Always be sure that the distilled water is pure. Never allow it to come in contact with metal.



Testing Battery with Hydrometer.

Distilled water may be obtained at the service station or at any drug store.

It is never necessary to add acid to your battery when it is functioning properly. While discharging the acid is absorbed by the plates; while recharging forces the acid out of the plates into the solution again. Only the water is evaporated.

The battery and battery compartment

should always be kept clean and dry and the terminals clean, bright and well covered with vaseline to prevent corrosion.

A fully charged battery will not freeze at any ordinary winter temperature, but a discharged battery will freeze at a little below 32 degrees Fahrenheit. Be sure to take hydrometer readings regularly. The gravity should always be up to at least 1.275. If you lay up your car the battery should be removed and placed in storage, where it may be kept charged.

Another precaution in battery care is to be certain that there are no leaky cells in your battery. When filling, if one cell takes considerable more water than others, this indicates that jar leaks. Unless repaired immediately the battery may be ruined.

Attend to Simple Things.

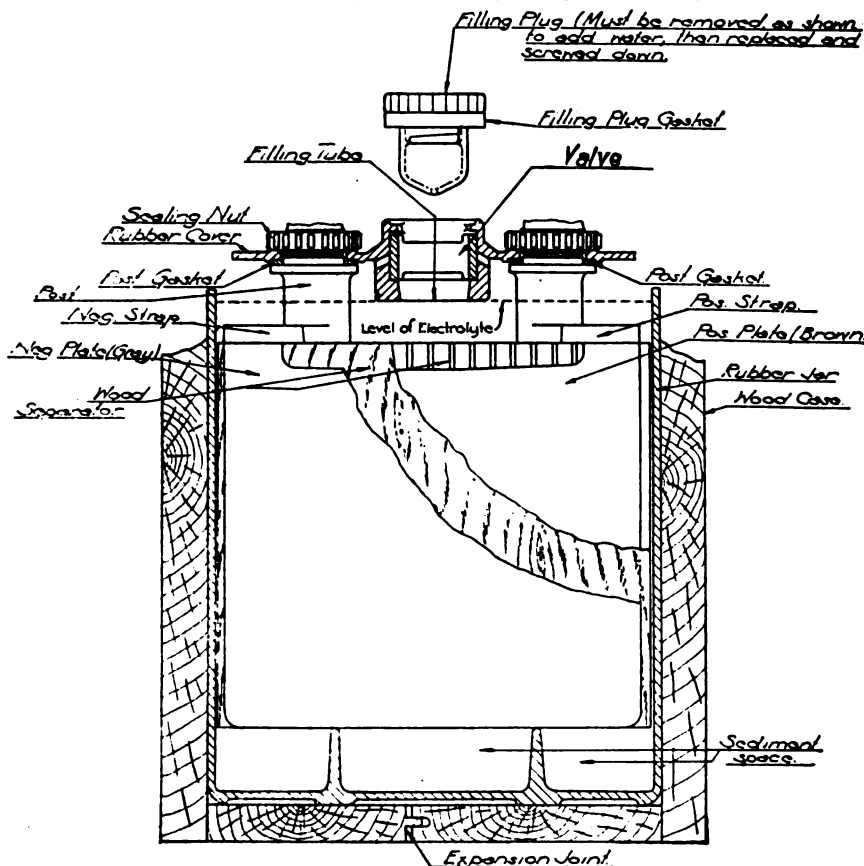
It is advisable to keep in touch with the nearest battery service station. It is naturally to the best interest of the battery manufacturer to see that the battery is working as it should. The service station man will make an examination of the battery and tell you its exact condition. He will explain its relation to the rest of the electrical system and how your driving in summer and winter affects the battery.

You cannot expect too much of him, however, if you neglect to show the respect your battery deserves. Watch the water in your battery as carefully as you do the oil in your engine or the water in your radiator. Attending to the simple things will prevent much inconvenience and trouble later.

The battery should be inspected once each week in warm weather and once every two weeks in cold weather to ascertain its condition. At each inspection several hydrometer readings of each cell must be taken before adding any water.

After testing the electrolyte be sure to replace it in the cell to which it belongs. If the specific gravity of one cell shows it to be considerably lower than the others at several successive readings, this indicates that the cell is out of order. Likewise, if one cell requires more water than the other it shows that the jar is cracked.

Never allow the battery to get completely discharged because it will sulphate the plates in the battery. In extremely cold weather keep the battery fully charged.



Interior Parts of Cell of Storage Battery Showing the Location of Plates, Separator, Etc.

Lubrication of the Automobile and Its Component Parts

FOR DETAILED CHART SEE PAGES 32 AND 33.

LUBRICATION is the most important detail of power vehicle operation.

Every part in moving contact must be lubricated to such a degree that there will be a film between the surfaces. When the lubricant is so diminished that there is metal-to-metal contact, wear that is quickly destructive is begun and it continues until the film is restored.

Knowing this, the safeguard is a plan for or a method of lubrication that can be depended upon. But seemingly the one obstacle to a plan is the fact that all oiling or greasing is not done at the same time. There is no reason why all parts could not be lubricated at any given time, provided one used reasonable care.

By this is meant that were one to adopt a formula and go over the oil and grease cups daily, and make every required replenishment, this would be admirable, and the only care needed would be to put into the receptacles approximately what had been used, if this could be judged accurately.

There are those who own and drive automobile vehicles who have not a very clear knowledge of the system of lubrication in their cars. A very large majority of those who drive guess when oiling and greasing. Automobile designers have made every practical provision for effective lubricity, provided the supplies are renewed as consumed. Obviously, a record is the best plan. This insures against neglect.

Lubrication by Formula.

Next to this is inspection and lubrication by formula—that is, doing the work by always beginning with one part and systematically filling each oiler and grease cup, and at regular intervals draining and cleaning the different housings and cases and refilling them, without regard to definite mileage, for there is danger in lack of lubrication, and only a waste that is inconsequential if oil or grease is supplied in excess.

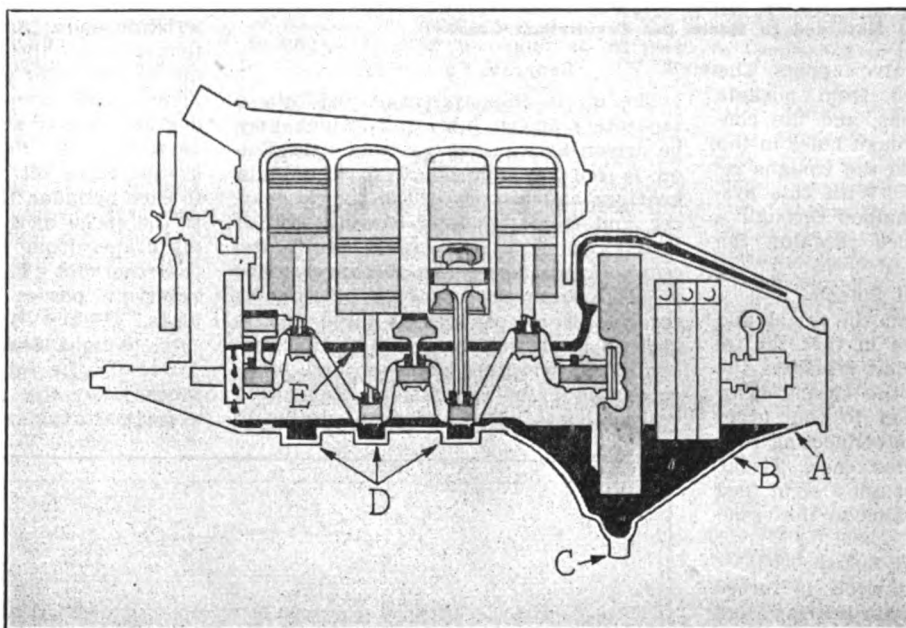
Use of the right lubricant is imperative because it will be the most effective and the most economical. There is no saving in cheap oil or grease. There may be times when one will be forced

to use what is unknown, but good judgment dictates what will best serve, for insurance against wear is well worth the price, especially with a construction that is as susceptible to friction as a high grade machine.

Ten Recognized Systems.

In principle of lubrication one general rule will apply, but there are no less than 10 different recognized systems for engines. These are shown throughout the text, and require but little explanation. These systems are:

- 1—Full splash.
- 2—Splash with circulating pump.
- 3—Pump over and splash.
- 4—Force feed and splash.
- 5—Pump over.



Full Splash System—A, High Level Oil. B, Low Level Oil. C, Oil Drain Out Plug. D, Troughs Under Connecting Rod Bearings. E, Oil Tube from Flywheel to Timing Gears.

- 6—Separate force feed.
- 7—Force feed.
- 8—Full force feed.
- 9—Knight slide valve engine.
- 10—Oil fed with fuel.

The main reason for explanation of these systems is that the reader may familiarize himself with any one or all of them. Generally speaking these may be divided into two groups, which may be classified as "circulating" and "all-loss" systems. The first class includes those in which the oil is placed in a crankcase reservoir to a fixed level and distributed by a mechanically operated pump to different parts, either by pressure and splash of the connecting rod ends or by splash. The second class includes those where the oil is fed directly into the crankcase or through the bearings from

an outside source, and which does not return to the source of delivery. The distribution may be by splash or by pressure. In these systems oil may be filled to a fixed level in the crankcase and supplied from an auxiliary source at approximately the rate of consumption.

That the above specified systems may be better understood the following brief statements of each is made:

Full or Straight Splash.

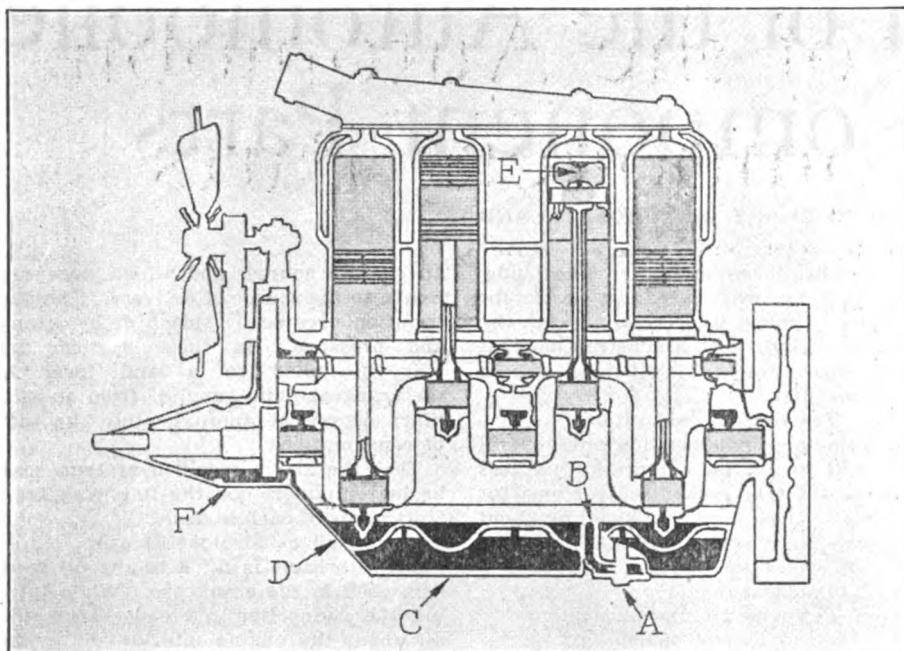
The lubricant is filled to the oil level drip cock in the crankcase. When turning the connecting rod ends throw the oil about the engine interior, oiling the crankpins through holes in the rod caps. The distribution from this force supplies the cylinder and piston walls, wristpin bearings, the cams and valve tappets. The drainage fills pockets that lubricate the main and camshaft bearings, and the timing gears are oiled by a dash of the oil over them.

The flywheel revolves in the oil reservoir, throwing some oil upward and into a funnel, whence it is carried by a tube to the timing gears, and draining toward the reservoir, is caught in troughs into which the connecting rods dip and is distributed by splash to the cylinder and piston walls, the wristpin bearings, the camshaft bearings, the cams and valve tappets. This system, which is typical of the Ford engine, lubricates the transmission gearset and the clutch. In this system never have the oil above the upper level drip cock.

In a modification of this system the oil is supplied from an outside source by a separately driven gravity float or gravity feed lubricator, usually at the rate the oil is consumed.

Splash with Circulating Pump.

The oil is supplied to a fixed level indicated by a gauge or float and draws from the reservoir and fed to a series of troughs under the connecting rod ends in the base of the crank chamber, whence it is distributed by splash to the main, camshaft and wristpin bearings; to the cylinder and piston walls, the timing



Splash with Circulating Pump—A, Oil Pump, Strainer and Drain Out Plug. B, Oil Tube from Pump to Troughs. C, Sump or Reservoir. D, Troughs into which Tips of Connecting Rod Bearings Dip. E, Oil in Head of Piston for Wristpin Bearings. F, Oil Retained in Basin for Crankshaft Gear.

gearset, the cams and valve tappets. The bearings are lubricated from pockets into which the oil drains, and the connecting rods take oil through holes in the caps. The overflow from the troughs returns to the reservoir. With this system the oil is often pumped through a sight feed glass before reaching the crank chamber.

Pump Over and Splash.

This system differs from the splash and circulating pump system in that the oil is pumped to pockets that lubricate the main bearings and to the timing gearset, and the distribution to the other parts is by splash of the connecting rods in the troughs in the crankcase. Usually the oil is pumped through a sight feed glass. The overflow drains to the reservoir.

Force Feed and Splash.

With this system the oil is forced under pressure to the main bearings and often to the timing gearset. The camshaft bearings are lubricated by drainage from pockets, and the distribution is by the sweep of the connecting rods in the troughs beneath them in the crank chamber. The oil is pumped through a sight feed glass. The drainage from the crank chamber returns to the reservoir.

Pump Over System.

The oil is drawn from the reservoir by a pump and through ducts to pockets that supply the main bearings and sometimes the timing gearset, thence from the main bearings through channels drilled in the crankshaft to the crankpins, and the oil thrown off by the centrifugal motion of the crankshaft distributes to pockets that supply the camshaft and the wristpin bearings, the cylinder and piston walls, the cams and valve tappets. This distribution sometimes supplies the timing gearset as well. The drainage returns to the reservoir. This system has a sight feed glass in the pipe that leads from the pump outlet.

the bottom of the crank chamber. The flow of oil from the reservoir is regulated to the requirements of the engine, and occasionally if the work is heavy there is splash distribution, but usually at the rate of consumption.

Forced Feed System.

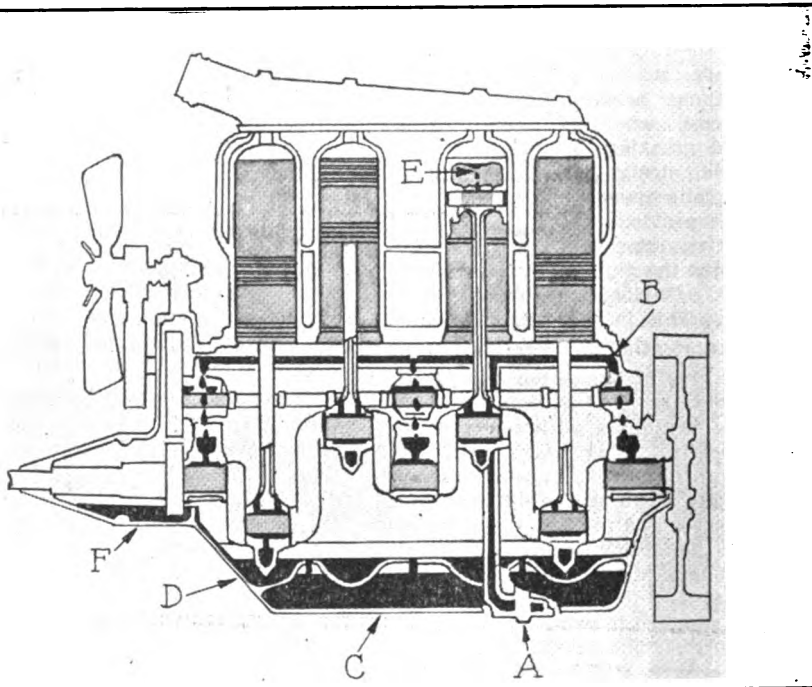
The lubricant is drawn from the reservoir by a pump and forced through ducts to the main bearings and the timing gearset, and through the drilled crankshaft to the crankpin bearings. The distribution by the movement of the crankshaft is to pockets that supply the camshaft and wristpin bearings, the cylinder and piston walls, the cams and valve tappets. The drainage into the crank chamber returns to the reservoir. The oil is usually circulated through a sight feed glass.

Full Force Feed System.

The pump draws the oil from the reservoir and forces it through tubes or ducts to the main bearings and the timing gearset, through ducts drilled in the crankshaft to the crankpin bearings and through tube on the connecting rods to the wristpins, the flow at the tube ends lubricating the cylinder walls at the wristpin ends. Some systems have leads that lubricate the camshaft bearings. The oil forced under pressure and the movement of the crankpins supply the cylinder and piston walls, the cams and the valve tappets. Some adaptations of this system force oil through separate leads to each cylinder, the feed being regulated to the speed of the engine. The surplus oil drains from the crank chamber to the reservoir. The oil pumped from the reservoir passes through a sight feed glass.

Knight Slide Valve Engine.

Usually the lubrication of Knight engines is by the pump over and splash system, although some have the full force



Pump Over and Splash—A, Oil Pump, Strainer and Drain Out Plug. B, Oil Tube Supplying Main Bearings from Pump. C, Oil Sump in Base of Engine. D, Troughs into which Tips of Connecting Rods Dip. E, Oil Accumulation in Piston Head for Wristpin Lubrication. F, Basin Under Crank Shaft Gear, Lubricating Timing Gears.

feed. In these engines the oil troughs into which the connecting rods dip are designed to be raised as the throttle is opened and lowered as it is closed, varying the depth of submersion of the dipper into the oil and the volume of oil distributed. The troughs are connected by bell cranks to the rod operating the carburetor valve. This variable supply of oil insures against carbonization and smoky exhaust.

Grooves are cut on the outside of both sleeves in each cylinder and holes are cut in each outer sleeve. Oil splashed on the walls of the inner sleeves lubricates the cylinder walls. Some oil is collected on the outer sleeves and passes through the holes in them to lubricate the outer walls of the inner sleeves their entire length. Some Knight engines have separate leads to the upper ends of the sleeves, which are both hand and throttle controlled, opening only when the engine is delivering full power. The splash also lubricates the eccentric shaft bearings from pockets and rods that drive the inner and outer sleeves are supplied by gravity flow from oil trapped in pockets in the upper and lower ends of the rods.

Oil Fed with Fuel.

Very effective lubrication is obtained with some engines by mixing approximately one pint of oil with each five gallons of fuel oil and by grease cups that are located on the shaft and pump bearings. In rare instances oil is dripped into the intake manifold and carried into the cylinders with the fuel gas. Both of these are used with marine engines as a rule.

Lubrication of the Engine.

In choosing an oil for the automobile engine much depends upon the type of engine, condition, lubricating system in use and climatic conditions. The main object is to select an oil having a suf-

ficient body and fire test so that it will produce a film of oil between all bearing surfaces, even when the parts become heated. The degree of fluidity depends upon the system supplying the oil to the working parts. In summer a heavier oil is required than in winter, and vice versa. The degree of wear of the working parts must be taken into consideration as a worn engine will require different oil than an engine in which the parts are new and perfectly fitted.

Lubricating systems of old type cars require a different grade of oil if used in low temperatures than do those of

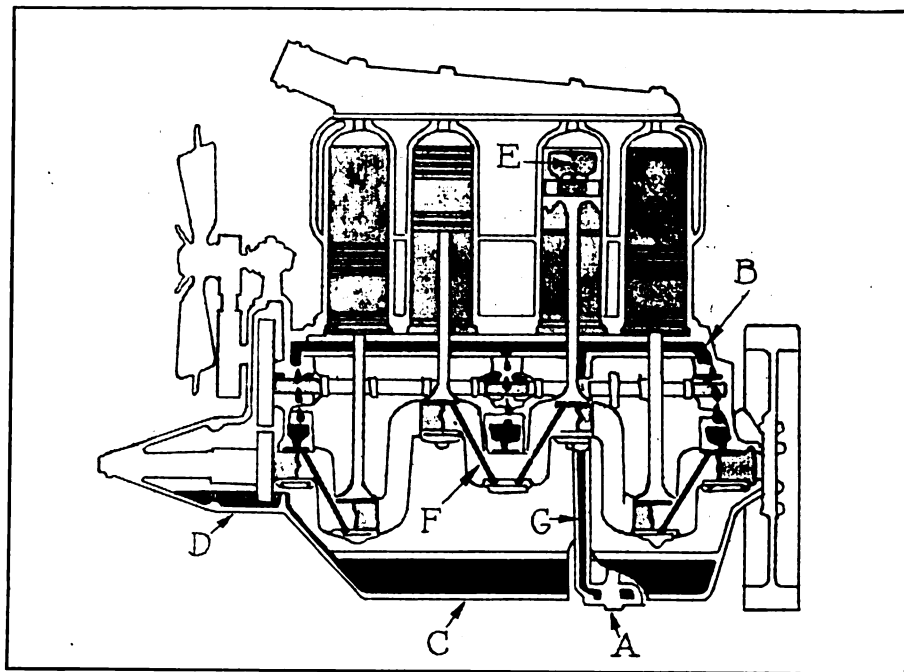
later models, if these include mechanical feed oilers located on the dash or the side of the engine. Oil for such systems should have a low cold test and flow at low temperatures. In later systems if the oil is carried in base reservoirs it need not have as low a cold test, as the engine heat keeps the oil so it will flow freely and distribute to the working parts of the engine.

If the oil in the reservoir is at too high a level, carbon or residuum of combustion will accumulate on the cylinder heads and the heads of the pistons. Excess of oil will be evidenced by blue or gray smoke issuing from the exhaust. Shortage of oil in the reservoir, or oil of too light a body, will cause the engine to overheat. If an engine has been operated for some time with a light bodied oil and has become noisy, using a heavier grade will possibly quiet it.

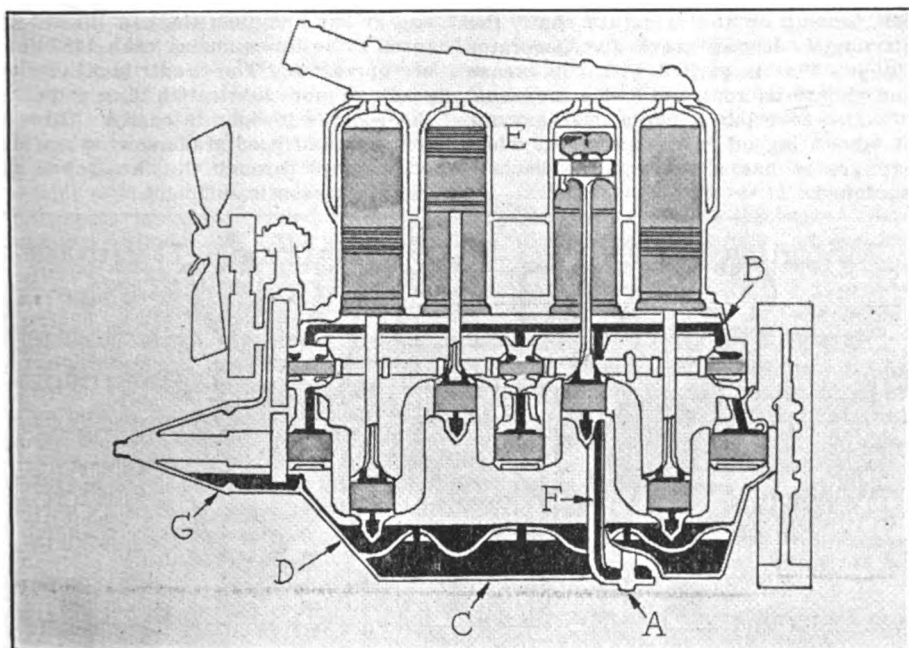
Air-cooled engines require heavier oils than do the water-cooled types, as they are heated to a greater degree and lighter oils do not withstand the higher temperatures. The heavier oils will have greater viscosity and will endure when used in an air-cooled engine.

Purchase oil only of reputable dealers and then only the grade recommended for your particular engine. In new engines oil of lighter grade body and used in greater volume than will be necessary later on, is advised until they are thoroughly "run in."

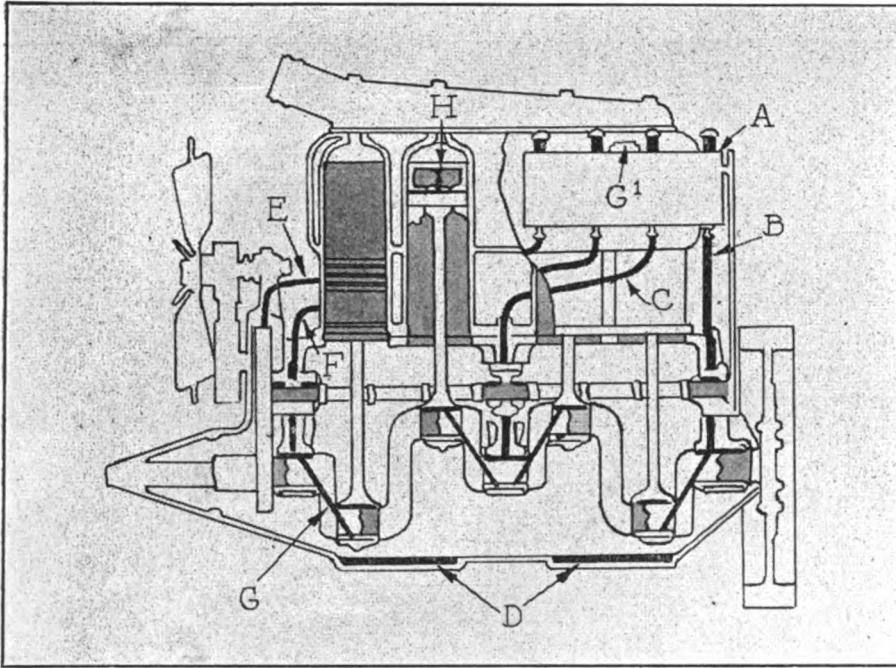
The cylinders and reciprocating parts are not all that require lubrication. The timing gears are housed in separate casings in some engines and require separate lubrication. These cases usually hold about one-half pint and cylinder oil of a heavy body should be used in them. Other engines depend upon the oil from the crankcase reaching the timing gears, either by direct feed or by splash.



Pump Over—A, Oil Pump, Strainer and Drain Out Plug. B, Oil Tube Leading from Pump to Main Bearings and Oil Ways in Crank Shaft. C, Sump or Reservoir in Base of Engine. D, Basin Retaining Oil for Crank Shaft Gear. E, Accumulation of Oil in Head of Piston for Wrist Pin. F, Oil Ways in Crank Shaft. G, Tube Leading from Pump.



Force Feed and Splash—A, Oil Pump, Strainer and Drain Out Plug. B, Oil Distributing Tube to Main Bearings. C, Sump or Reservoir in Base of Engine. D, Troughs and Tips of Connecting Rod Bearings. E, Accumulation of Oil in Head of Piston for Wrist Pin Lubrication. F, Tube Leading from Pump to Main Bearing Distributing Tube. G, Oil Retaining Basin Under Crank Shaft Gear.



Separate Force Feed—A, Oil Reservoir at Top of Engine. B, Oil Tube Leading to Rear Main Bearing and Crank Shaft Oil Way. C, Oil Tube Leading to Center Main Bearing and Oil Ways in Drilled Crank Shaft. D, Oil in Base of Engine. E, Oil Tube Leading to Timing Gear Case. F, Oil Tube Leading to Front Main Bearing and Drilled Oil Way in Crank Shaft. G, Drilled Oil Way in Crank Shaft. H, Oil Accumulation in Head of Piston for Wrist Pin Lubrication.

Oil Pressure Regulation Important.

Many engines have pressure relief valves included in the oil systems. The regulator is usually located at one side of the engine base and is accessible for regulation. Its purpose is to release the oil from the system at a predetermined pressure.

This pressure is in ratio to the speed of the car and may be from three to 15 pounds, the maximum being obtained at about 35 miles per hour. If gauge shows an unsteady pressure it may be caused by a piece of lint or dust getting underneath the regulator and preventing it closing. Removing the regulator and cleaning the seat will restore normal functioning. Care must be taken to note that the oil will by-pass at the pressure recommended by the manufacturer. If it does not, regulation is obtained by increasing or decreasing the tension on the regulator spring with the adjusting screw.

The starting crank bearing is best oiled with an oil can, the water pump shaft by screwing down the grease cups on the bearings. A heavy cup grease or mutton tallow are excellent for this purpose. The fan bearings are usually a ball type, having a grease cup located on the hub, which should be kept filled with heavy cup grease and turned down. Or the hub may be packed at the beginning of the season with a heavy grease which will be practically sufficient for the year.

Electrical Apparatus.

Special care should be directed to oiling the electrical apparatus. Light spindle or sewing machine oil should be used in small quantities. Three systems of electrical lighting apparatus are installed in automobiles. The one most generally known is the Ford. This magneto is in part mounted on the flywheel. It is lubricated by splash in the base of the engine

and provided the oil is kept at the normal level the magneto should be well supplied.

Delco Motor Generator.

There are five places to lubricate the motor generator. Referring to the cut of the Delco motor generator these are:

(1) Oiler "A" lubricates the bearing on the distributor shaft. This should receive four or five drops of engine oil every week.

(2) Oiler "B" lubricates the roller bearings on the rear end of the armature shaft. This should receive four or five drops of engine oil every week.

(3) Lubricator "C" at the front end of the motor generator lubricates the ball bearing on the armature shaft, the distributor driving gears and generator clutch. This is packed with cup grease and should be repacked twice a season. It is also advisable to add a small amount of lubricating oil in cold weather, when cup grease has a tendency to become hardened.

(4) Grease cup "D" lubricates the starting gear shaft and the one-way clutch. This forces grease through the starting gear shaft into the clutch. This should be given a turn or two every two weeks.

(5) That part of the inside of the distributor head upon which the rotor button bears should have a small quantity of vaseline applied to it two or three times during the first 2000 miles usage of the car, so that the rotor button can polish this track and prevent cutting. The rotor button should be kept polished smooth and bright.

By removing the distributor head and rotor from the Hudson Super-Six distributor unit, a few drops of oil may be applied directly on the upper ball bearing of the distributor shaft. The Cadillac distributor has an oiler for the top ball bearing. Pack cup grease every 1000 miles around the gears within the distributor housing. This also lubricates the lower bearing of the distributor shaft.

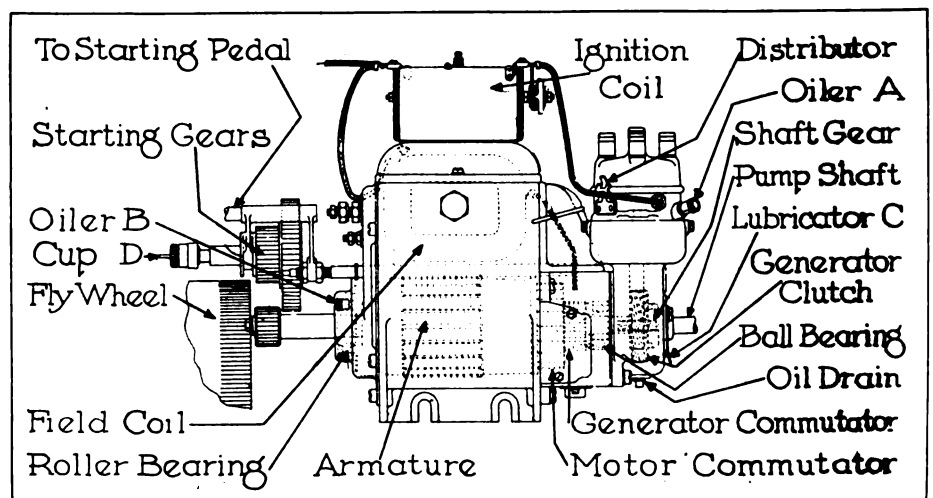
Remy Two-Unit System.

The Remy two-unit system is typical of many two-unit systems and directions for oiling will practically apply to others.

No provision is made for oiling the ball bearings. The experience of the manufacturer is claimed to prove that when ball bearings are packed with lubricant (preferably fiber grease), such as K-2, the lubricant will last indefinitely. Never use a lubricant for ball bearings lighter in body than 600 W oil.

Never use gasoline for cleaning a machine unless it has been completely dismantled. If necessary to dismantle a generator, pack the ball bearings in K-2 (fiber grease), or fill them with a fluid lubricant no lighter in body than 600 W oil.

On machines with grease cups on their distributors, if provided with wicks, fill with a good grade of vaseline about once every 1000 miles of operation. If the generator is fitted with regular grease cup, keep it filled with a good grade of cup grease and turn the cap inward $1\frac{1}{2}$ turns three times during each 1000 miles of operation. The centrifugal switch needs no more lubrication than will cause the weights to operate easily. Three or four drops of good grade sewing machine oil dropped through the thrust ball slot twice a season is sufficient.



Sectional View of Delco Generator Showing Principal Points Requiring Lubrication.

A slight trace of vaseline should be placed on the steel cam, at such place as will reduce the wear of the breaker lever fiber block, when making an inspection.

The timer, if a platinum contact point type, needs lubrication only at the bearing points. If a roller contact type, use sewing machine oil sparingly in the timer interior. Never use grease or graphite; the latter will short-circuit the current, the former will gum and prevent good contact between the roller and segments. Avoid the use of machine or cylinder oil in magneto, generator and starting motor bearings; use only light oil and a few drops at a time. If these bearings are oiled too frequently the windings on the armature may become saturated with oil. This will result in a short-circuit. Avoid the use of oil in magneto contact breakers or distributors, for these parts are intended to run without oil.

In cleaning the timer and distributor with a cloth moistened with gasoline, be sure to have the ignition switch turned off and one of the battery terminals disconnected. If a spark should occur while this work is being carried on, fire might result and cause serious damage. For the same reason allow the gasoline to evaporate before replacing the distributor cover.

Clutch Types and Their Lubrication. Ford Clutch.

Referring to the chart pages 32 and 33, several types of clutches are shown. The Ford clutch is probably the simplest and best known. This is a multiple disc type, operating in oil. Lubrication is supplied from the base of the engine and as long as the oil is at normal height in the reservoir the clutch will be well lubricated.

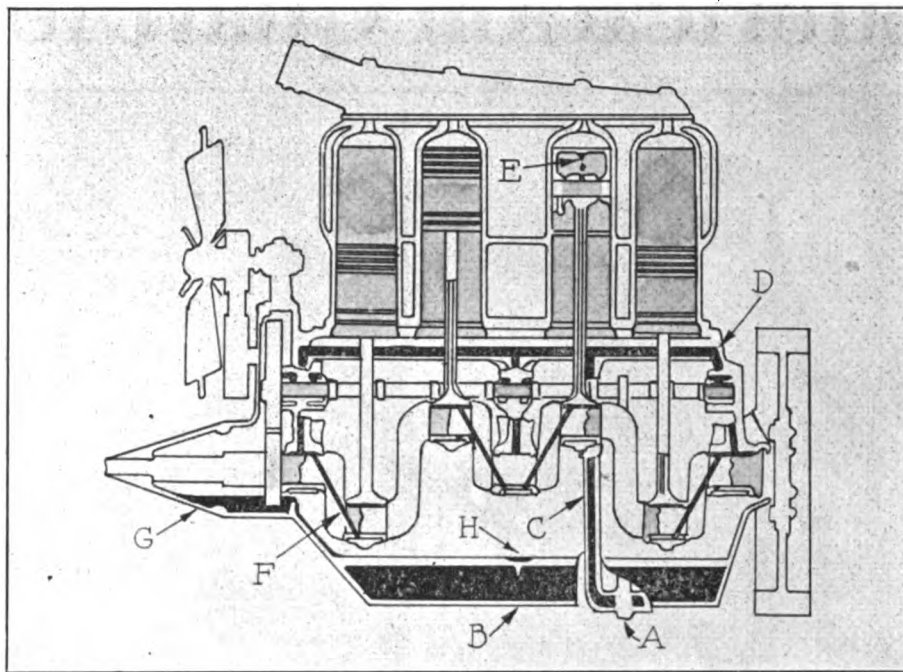
Cone Clutch.

The cone clutch requires lubrication usually at three points: The grease cup on the yoke bearing where the foot pedal attaches; the end thrust bearing and the bearing of the clutch hub on the shaft at the rear of the flywheel. The last two bearings are lubricated with an oil gun or cup, using steam cylinder oil or semi-fluid grease. The release yoke and rolls in some models are oiled by hand with steam cylinder oil. The clutch leather facing must be kept pliable with neat-foot oil or castor oil. Cylinder oil should never be used for this purpose. Oil accumulations on the clutch leather will cause slipping; these accumulations must be washed off with kerosene or gasoline, preferably gasoline, and the moisture absorbed with borax or fuller's earth.

The cone type clutch is used on the following passenger cars: Chevrolet 490 and F. B. four-cylinder models, Studebaker Six, Pierce-Arrow Six, Scripps-Booth, Marmon 34 Six and the Willys-Knight Eight.

Dry Disc Clutch.

Dry disc clutches operate practically the same as cone clutches and are intended to be run dry except for the three points noted under cone clutches. This applies to multiple disc clutches having the driving members faced with anti-friction fabric.



Force Feed—A, Oil Pump, Strainer and Drain Out Plug. B, Oil Reservoir in Base of Engine. C, Oil Tube Leading to Distributing Tube. D, Distributing Tube to Main Bearings and Drilled Crank Shaft Oil Ways. E, Accumulation of Oil in Piston Head for Wrist Pin Lubrication. F, Drilled Oil Way in Crank Shaft. G, Oil Basin for Crank Shaft Gear.

Multiple disc clutches having all metal plates are usually enclosed in an oil-tight casing and are intended to operate in an oil bath. This type is lubricated by supplying through a filling plug enough oil to almost touch the center shaft. A good lubricant for clutches of the all-metal type is a half-and-half mixture of light oil and kerosene. Special lubricant of the proper body for disc clutch oiling may be obtained from supply houses.

Slipping of Lubricated Disc Clutch.

When an enclosed disc clutch which runs in an oil bath slips or engages harshly, it is no indication it is in need of adjustment. Before attempting adjustment, first drain the old oil, inject a pint or more of kerosene, preferably with a squirt gun and then close the opening to the casing. Start the engine and with the gear shifting lever in neutral operate the clutch pedal so the kerosene may be thoroughly distributed and the internal mechanism of the clutch well flushed and cleared of old oil. Then drain the clutch casing, flush it once or twice with clean kerosene and refill with clean oil.

If the clutch still slips draw out a small quantity of oil and put in an equal volume of kerosene. Thinning the oil ought to afford better contact between the plates. Unless the proportions of oil and kerosene are known it may be necessary to thin the lubricant gradually until the desired mixture is obtained. Once it is found, however, the reward is a fine, smooth action.

If slipping cannot be prevented by thinning the lubricant, increased spring tension may be obtained by tightening the adjusting studs evenly all around. It is good engine practise never to vary an adjustment unless one has absolute knowledge of the operation and effect of the change.

When the Clutch Grabs.

When a clutch of the disc type running in oil engages too harshly, drain the oil, flush the plates and case with kerosene and refill with fresh oil. If this does not restore normal action, readjust the clutch until efficiency is obtained.

When a clutch is new there may be a slight tendency to slip. No adjustment of the spring is necessary to regulate this condition, as it will disappear after the car has been in use a short time.

Lubrication of Change Speed Gears.

Change speed gears commonly used are a sliding gear type. The gear box is designed to be filled about half full of semi-fluid grease or heavy bodied steam cylinder oil, the level of the lubricant being one inch below the main drive shaft, which will be sufficient to thoroughly lubricate the gears. Heavy grease should be avoided, for the gears will cut a path through it and the gear teeth be without lubrication in a very short time.

It is important in lubricating the change speed gears that the oil or grease should not be too heavy, for in that case it will stick to the gears and be thrown from them by centrifugal force against the side of the gear case. This happens for the first few minutes, but after the mechanism has been in operation for some time they will run clear of the lubricant and heat. The best lubricant is a heavy oil that will run, or a grease of such consistency that it will flow and cover the gears as they revolve and reach the bearings. There are many semi-fluid greases and heavy oils prepared for gear case lubrication that will afford satisfaction.

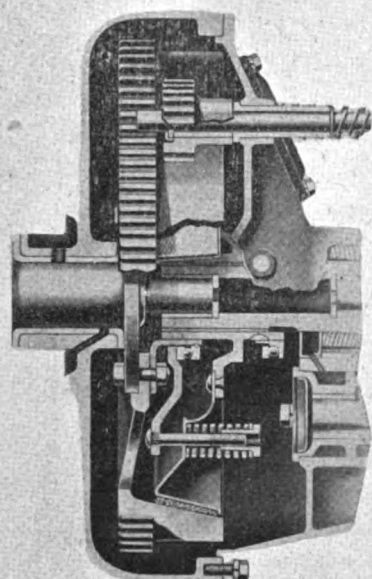
In filling the change speed gear case, completely submerge the countershaft in the average gear case and have the lower faces of the main shaft gears in the lubri-

Lubrication Chart for Modern Automobiles

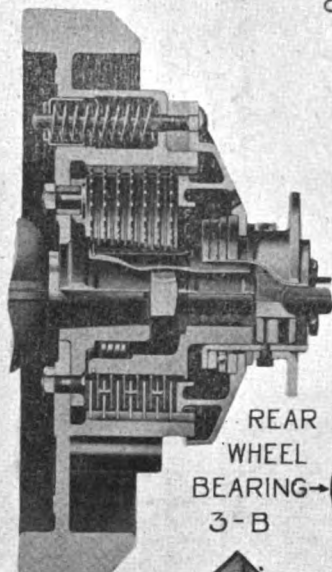
DRY DISC CLUTCH
ASBESTOS FACE

FORD TRANSMISSION
& CLUTCH RUNNING
IN OIL

BUICK TR
BALL BEA
SHAFT



CONE CLUTCH
LEATHER FACE



BRAKE CAM
3-B

EQUALIZER
BARS & BALL
JOINTS 3-A

STEERING COLUMN 3-B

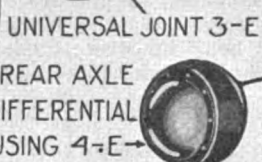
FRONT
SHACKLE

STEERING
CASE & REAR
ROD BALL &
SOCKET 3-D

UNIVERSAL
JOINT 3-E

REAR
WHEEL
BEARING
3-B

REAR SPRING
SHACKLE BOLT
3-B



UNIVERSAL JOINT 3-E

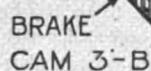
REAR AXLE
DIFFERENTIAL
HOUSING 4-E



REAR
SPRING
SHACKLE
BOLT 3-B



REAR
WHEEL
BEARING 3-B



BRAKE
CAM 3-B

REAR SPRING BOLT-INTERNAL
& EXTERNAL BRAKE SHAFTS
3-B

TRANSMISSION
4-E

CLUTCH
& BRAKE
SHAFT 3-B

EMERGENCY BRAKE
LEVER 2-A

CLUTCH
SHIFT
BEAR

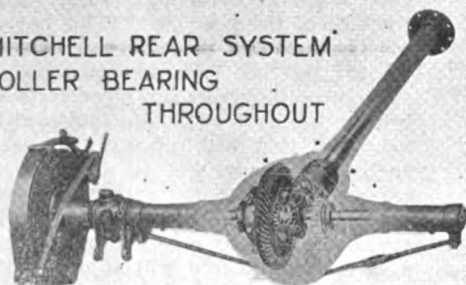
TYPICAL
UNIVERSAL JOINT-
OIL TIGHT HOUSING

CHART KEY

- 1 - EVERY 300 MILES
- 2 - " 500 "
- 3 - " 1000 "
- 4 - " 2500 "
- 5 - KEEP FULL

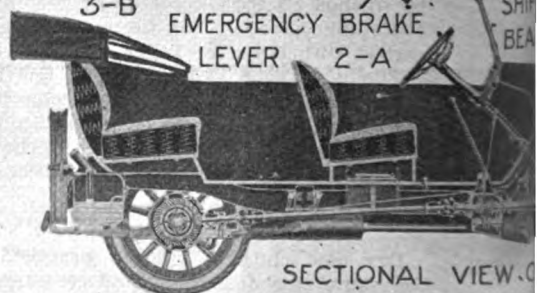
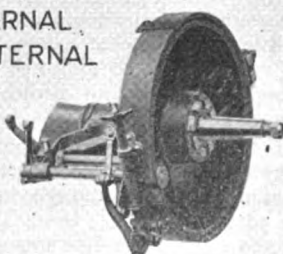
- A-CYLINDER OIL
- B-CUP GREASE
- C-SPINDLE OIL
- D- $\frac{1}{2}$ A - $\frac{1}{2}$ B
- E-TRANSMISSION OIL

MITCHELL REAR SYSTEM
ROLLER BEARING
THROUGHOUT



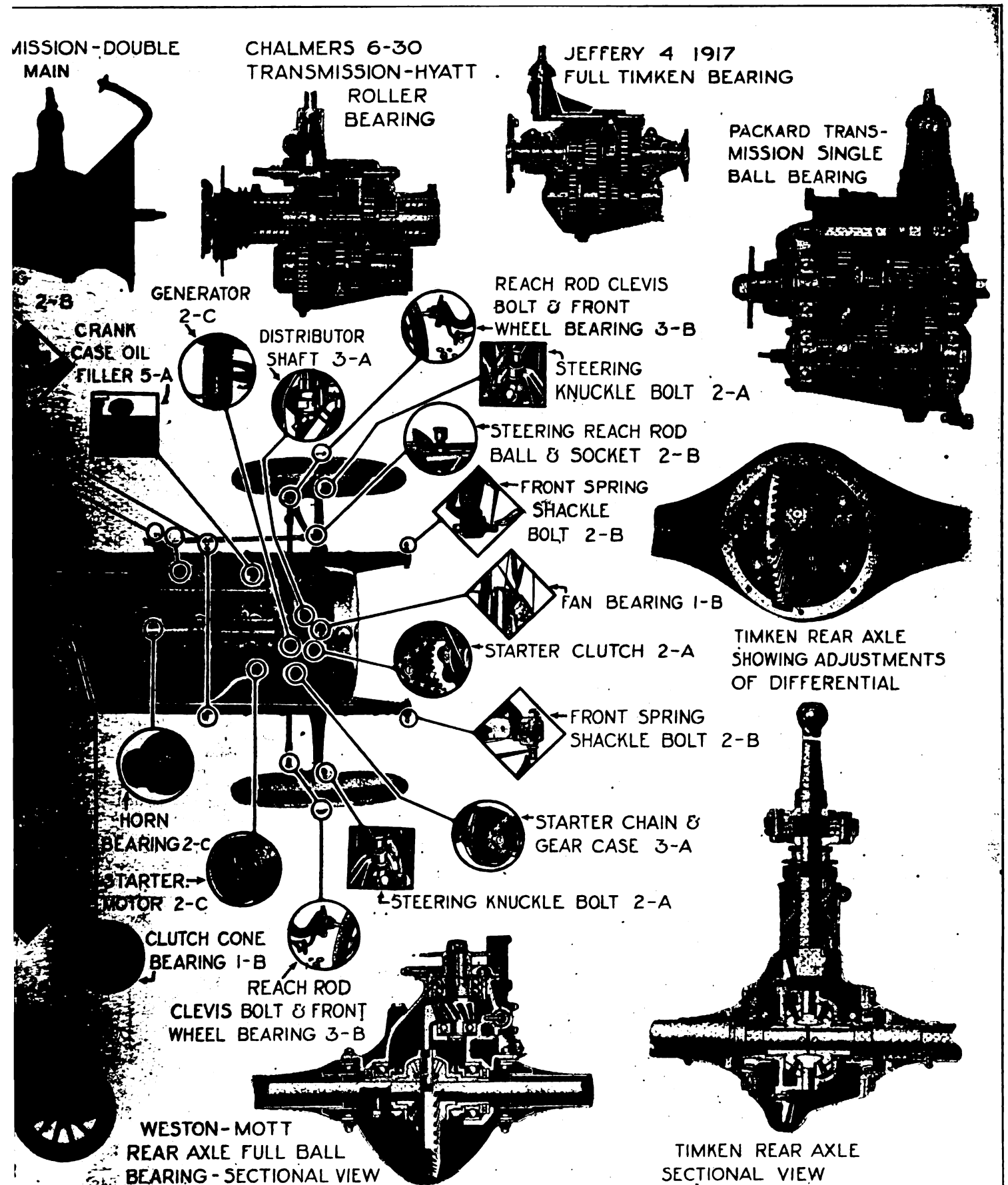
PERSPECTIVE VIEW

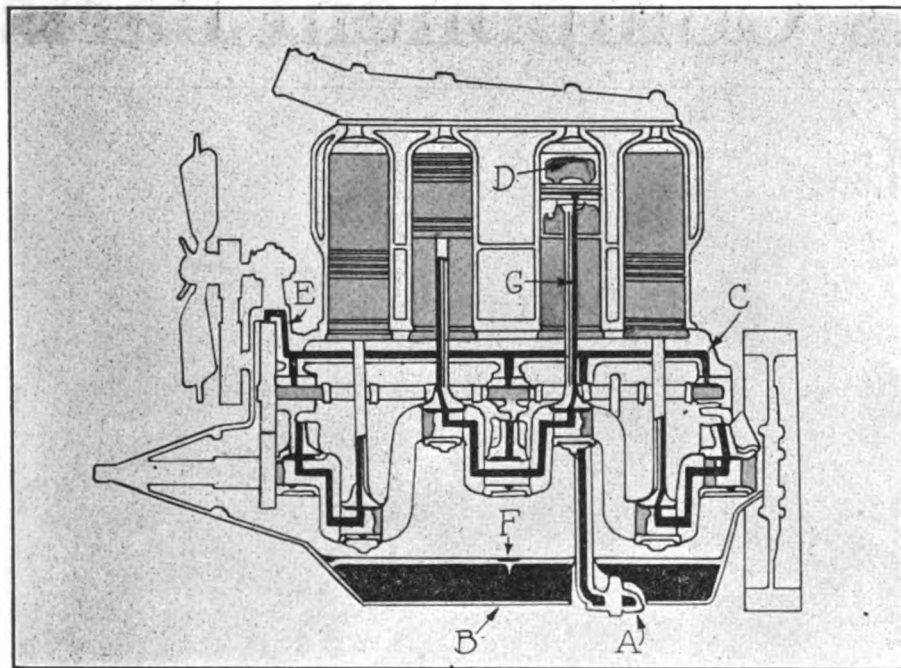
PACKARD BRAKE
SHOWING ARRANGEMENT
OF INTERNAL
AND EXTERNAL
BRAKES



SECTIONAL VIEW OF
TYPICAL 4 CYLINDER

Automobile and Its Component Parts





Full Force Feed—A, Oil Pump, Strainer and Drain Out Plug. B, Oil Reservoir in Base of Engine. C, Oil Distributing Tube to Main Bearings and Oil Ways in Drilled Crank Shaft. D, Accumulation of Oil in Piston Head. E, Distributing Oil Tube Entering Timing Gear Case. F, Overflow Into Reservoir for the Return of Oil from the Bearings to Reservoir. G, Oil Way on Connecting Rod to Lubricate Wrist Pin Bearing.

cant. It is important to see that the packing rings are tight and prevent leakage at the drive shaft bearings. If there is leakage dirt and dust will be accumulated and the gears will not have good lubrication.

Greases containing wood fiber or granulated cork should be avoided.

Planetary gearsets are seldom used. That of the Ford car is oiled by the lubricant in the engine base. Where the gearing is in a separate case, as in old type cars, use a very light semi-fluid grease, making replenishments with a syringe or oil gun through the filling openings.

Change speed gearing of the positive sliding clutch type with gears always in mesh, or those driven by silent chains, may be oiled as are the sliding gearsets.

Friction disc forms use grease only at bearing points. The driving surface should be kept free from oily accumulations. This form of power transmission is practically obsolete.

Lubrication of Rear Axles.

About every 5000 miles of driving drain the oil from the differential housing and flush with kerosene. Then refill the case to the level with fresh oil. In axles having bevel gearing a lubricant should be used of about the same consistency as used for change speed gears, which should be introduced through the filling spouts. On many axles the filling spout on the differential housing is at the level the oil should have. This is usually about one inch below the axle shaft. The drain out plug is at the bottom of the case.

If the drive is a worm shaft and worm wheel the lubricant should be of a more fluid, and probably the best oil to use would be a heavy grade of steam cylinder oil. Such an oil will be carried up and onto the worm, lubricating it thoroughly. The worm wheel will lubricate the bearings of the differential.

Many trucks are driven by chains, the drive being from the jackshaft sprockets to sprockets on the rear wheels, which revolve on fixed axles. Such chains need attention frequently else they will lose efficiency. They must be removed, cleaned with gasoline or kerosene, wiped dry and hung for a few hours to thoroughly dry, and should be examined for weak links or rivets. A good lubricant for chains is hot tallow and graphite. Dip the chain in the hot tallow and graphite mixture, hang it by the end and while the tallow is hot, wipe it with waste. The mixture will penetrate the joints and the chain will have high efficiency for several hundred miles. Oiling chains with engine oil is not recommended as the oil will accumulate dust that will quickly become a cutting component.

Universal Joints.

Most passenger cars and many trucks have drive shafts between the change speed gears and the rear axle and these shafts are fitted with one or more universal joints. Where a torque tube encloses the shaft, one joint is used. Where the torque is taken by an arm or rod, two joints are used, and, in some make of trucks three and four joints. The joints are to compensate shaft angularity and chassis distortion. The shafts are made in sections to prevent whipping and in large chassis the gear box is placed

amidships to shorten the shafts.

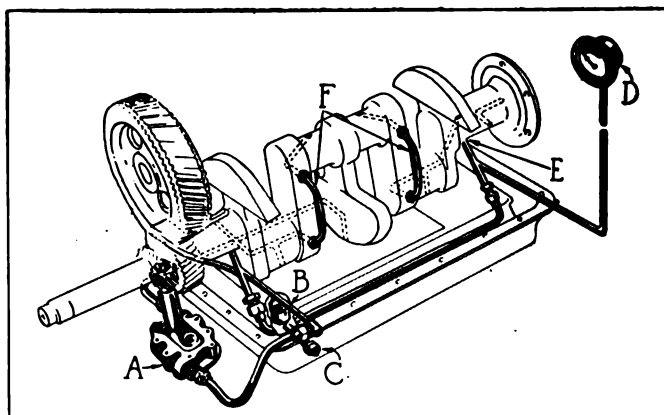
The methods of housing universal joints vary. In chassis of older make provision was made to cover the joints with leather or fabric boots wired to the shaft and the bell of the joint. The interiors of these boots were filled with cup grease of heavy consistency. Later joints are covered with metal housings. These housings are filled about two-thirds full of semi-fluid grease, introduced with grease guns through plug openings. The joints should be filled at least once every 2500 miles.

Differential Housing.

The differential housing encloses the differential gearset, the master gear, driving pinion and the various bearings and retains the lubricant for the mechanism of the axles. If the housing is damaged or ill fitting the grease will work through and accumulate with dust on the outside and be very unsightly. Care should be taken that the bolts and nuts retaining the housing sections are tight and there are no leaks. Oil and grease from the differential may work through around the axle shafts to the outer bearings and onto the hubs of the wheels and the brake drums. This may be prevented on a Ford car by removing the wheels, taking out the bearings and the felt washers and replacing the washers. This leakage is caused by axle shaft end play and pumping grease from the differential. With Ford cars fitting new thrust rings will prevent the leakage. The differential housing should be drained at least once every 2000 miles, flushed with gasoline and refilled with fresh oil or semi-fluid grease.

Wheel Bearings.

The ball and roller bearings of the front and rear wheels of passenger cars and trucks should be packed with light grease every 1000 miles. This is easily done with front wheels by removing the hub caps and refilling with grease. Screwing the caps on the hubs forces the grease into the bearings. Roller type bearings are used mostly in rear axle wheel hubs and these are oiled with either light grease or steam cylinder oil forced through plug openings in the wheel hub. Some machines have double ball bearings for the rear axle. The bearings should at all times be free from grit and before supplying fresh lubricant



Cadillac Oiling System, Force Feed—A, Oil Pump and Strainer. B and C, Pressure Regulator and Distributing Tube to Front and Rear Main Bearings. D, Oil Gauge on Dash of Car. E, Tube to Rear Main Bearings. F, Outside Oil Tube Connecting Oil Ways at Center Main Bearing.

it is a good plan to flush them with gasoline to remove foreign substances.

Spring Lubrication.

A detail which conduces much to the easy riding qualities of a car is oiling the parts of the springs in frictional contact. It is becoming a practise to make provision for lubrication of the springs. If the springs rust they become bound and their action is dampened. The best restoration is to lubricate the ends, which can be done with a spring leaf spreader so that oil or oil and graphite can be injected between the leaves or applied with a thin blade.

Probably the best method of lubricating the springs, and the one that is most used by the repairers, is to jack the body at one corner, allowing the wheel and axle to hang free. The leaves will spread far enough for the application of either graphite and light oil or hot paraffine oil. As practically all of the work of a leaf is at the ends, lubrication thoroughly applied there will usually be sufficient.

Other important points to lubricate are the spring shackle bolts. These are oiled with machine oil, if provided with oil cups, and with grease if fitted with compression cups that are turned down daily. The spring seats on some rear axles are also fitted with compression cups to receive lubricants, especially if these members are intended to oscillate on the axle housings. Every season the springs should be taken apart, all rust removed from between the leaves and light grease and graphite smeared between the leaves when the springs are reassembled.

Steering Gear.

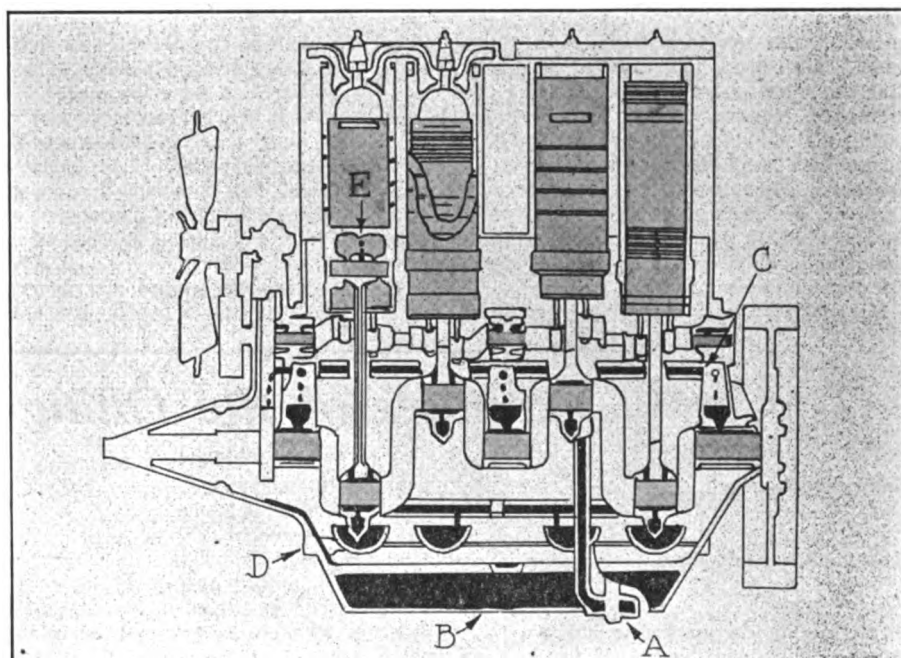
The steering gear housing at the base of the steering column is usually fitted with either a compression grease cup or a pipe plug through which grease or steam cylinder oil is applied to the working parts within the housing. Generally another grease cup is on the bearing containing the sector arm shaft outside the car frame. Still other cups may be found at each end of the tie rod and the knuckle pivots. These cups are to be filled with grease and turned down at stated periods. The spark rod and throttle control lever at the top of the steering wheel require a small amount of oil at frictional points. The ball joint and drag link and yoke bearings on the tie bar must be kept oiled or greased. All compression cups on the steering assembly joint must be screwed down daily or twice a week if the car is used infrequently. All oil holes should receive oil once or twice a week.

Control Levers.

The control levers for shifting the gears and applying the emergency brake and the clutch and brake pedals are fitted on cross shafts in many passenger cars and these shaft bearings must be oiled by hand. The small rod end bearings or yokes of the brake rods and the axle housing supporting the brake control shafts also need frequent attention with the hand oil can.

Removing Used Lubricant.

As oil and grease are used they gradually depreciate in value as lubricants and they must be replenished. If a change is necessary from one make of oil



Knight Sliding Sleeve Engine—A, Oil Pump, Strainer and Drain Out Plug. B, Oil Reservoir in Base of Engine. C, Oil Distributing Tube to Main Bearings. D, Adjustable Oil Troughs, Tips of Connecting Rod Bearings Dipping Into Them. E, Accumulation of Oil in Piston for Wrist Pin Lubrication.

to another, the best method is to remove the old and and refill with new clean oil. The reason for this is that oils do not mix readily. When two oils are mixed or shaken up as in an engine base, air bubbles form. This causes a mixture of air and oil to be brought in contact with the bearing surfaces instead of lubricant.

Cleaning or draining the crankcase should be done once a month, or about every 1000 miles of driving. It should be done also at the end of the first 500 and 1000 miles use of a new car. Drain the oil through the plug in the base of the engine and flush thoroughly with kerosene or gasoline to remove all sediment. This sediment may consist of products of combustion, metallic particles, dust and organic matter put into the engine with the oil. If it accumulates it may do considerable damage to the bearings. As the kerosene in the very generally sold fuel gasoline will pass the pistons and dilute the crankcase reservoir oil, draining and replenishment of the lubricant is an insurance against worn bearings.

While the engine base is filled with kerosene or gasoline, the engine should be turned over several times by hand to wash the interior thoroughly.

If the engine has an electric starter turn the engine over for about 15 seconds with the starter. This will thoroughly clean the oil circulating system. It is important that all kerosene be drained from the crankcase so the new oil may not be diluted. In engines having baffle plates in the base to prevent the oil surging, it will be necessary to take off the lower section of the crankcase to remove all of the kerosene. After being thoroughly drained the oil strainer should be cleaned, replaced and the crankcase refilled with fresh oil.

If the oil circulating system of the engine includes a pressure gauge, excessive pressure or no pressure at all at a

speed of 15 to 25 miles an hour indicates plugging of the oil circulating system, which should be investigated immediately. The same is true of the stoppage or irregular action of a sight feed gauge. Oil pipe check valves may clog and a wise precaution is to clean them.

A wet plate or multiple disc clutch running in oil should be drained and cleaned with kerosene once a month or every 1000 miles. When cleaning with kerosene run the engine and disengage the clutch several times. Do not use too heavy an oil in the clutch as it will cause it to either slip or drag or both.

A good rule to follow with grease cups is to turn down the cup cap till the grease is known to have filled the bearing. Exceptions to this rule would be only when grease cups are used in such a place that a surplus of grease would prove damaging to other parts in close relation to the bearing. However, grease cups are usually turned too little rather than too much. All surplus grease around the cap edge should be wiped off and the caps kept free from dust. In screwing down grease cup caps it is easy to cross thread them. The cap must be held square and turned down evenly. If a cap turns hard, it is probably crossed and should be unscrewed and started over again. The same thing applies to grease guns with fine threads. Equalizer bars should be oiled instead of greased, as this will not accumulate dust as quickly as would the grease.

A few points that are well worth remembering are as follows: Do not forget that an air-cooled engine requires a heavier grade of oil than a water-cooled engine on account of the higher temperature at which it works. Bear in mind that oil will eventually lose its lubricating qualities. Never fill the oil reservoir above the prescribed level recommended by the manufacturer, unless for a short time directly after an overhaul,

or when the bearings have been tightened. More oil is then needed to insure that the bearings are not worn from the increased friction. Never expect lubricating oil to restore mechanical defects. Do not use light oil when a heavy oil is necessary. Summer driving requires medium oil on account of the higher temperature, while winter driving requires a somewhat lighter grade, depending upon the car and cooling system.

Magneto bearings require a very light

lubricant, such as spindle oil, and that in small quantities at long periods.

Don't Race New Engine.

Do not race the engine of a new car or drive faster than 25 miles an hour for the first 500 miles. The parts are new, fit tight and a seized piston may result, taking more out of the engine and its parts than a season's driving at normal speed.

When filling the engine oil reservoir, make sure that the utensils are clean.

Measures, funnels and strainers that have been exposed and not thoroughly wiped may have grit, dust or abrasives on them. Any foreign substance in the oil may be carried into the bearings and cause much damage.

Bear in mind that lubrication of the car means increased service life and if this is neglected the best car that can be purchased will not be satisfactory.

Buy oil of reputable dealers and use this oil as prescribed.

Troubles of the Oiling System

Condition.	Cause.	Restoration.
Engine heats	Low oil in reservoir Grade of oil poor Oil pipe clogged Too light oil Crankcase joints leaking Pump or tubing leaking	Refill reservoir Drain out, supply good oil Clean out pipe Use heavier oil Supply new gasket Remove and repair
Heavy oil consumption	Fails to indicate height in reservoir Oil indication for the reservoir not correct	Run wire through and free petcock Straighten
Oil level petcock plugged or stuck Pointer of oil level bent	Oil cannot pass	Remove screen and clean with gasoline Disconnect feed pipe and prime pump with oil Blow out with tire pump
Filter screen mesh filled with lint and sediment No pressure at gauge	Pump air bound Feed pipe clogged Oil supply in reservoir exhausted Screen clogged Oil level too high Oil passing by piston and rings	Refill reservoir Remove and clean Drain to proper level Replace with new rings
Blue smoke at exhaust		
Carbon accumulates quickly in engine	Poor oil Oil level too high in base Fouled filter screen Regulator not working properly	Drain and refill with good oil Drain to proper level Remove and clean Clean and adjust
Irregular oil feed	Oil tubes clogged Oil too light Oil screen plugged Oil pipe bent or plugged	Remove and clean Drain and refill with heavier grade Remove and clean Remove and straighten or blow out with tire pump
Bearings overheat after several miles of use Oil feed not working, pump working	Lint in the sight feed Oil will not flow Oil will not circulate	Clean out Remove pump and clean check valves; note that valves seat properly Examine drive
Ball check valves stuck (plunger pump only) Defective pump drive		
Pump plunger and cylinder worn (plunger type only) Sight feed gauge leaks Sight feed glass fills full Metal float punctured	Irregular oil feed Oil overflows at gauge Oil not flowing away Reading incorrect, shows reservoir empty continuously Incorrect reading Bearings too tight Lack of oil Oil too heavy	Replace cylinder and plunger with new parts Remove cover and supply new gasket Force air through discharge pipe Remove, empty oil and solder
Oil indicator loose on rod Engine heats quickly and cranks hard		Remove and tighten Readjust bearings Refill with oil Refill with lighter oil
Engine runs at its best when hot, cranks hard Engine loses power when hot Engine noisy, scraping sound Engine noisy (squeaks)	Oil too light Piston or cylinder dry Bearings dry or too tight	Refill with heavier oil Low oil in reservoir; refill Stop engine, loosen bearings and clean oilways
Engine sticks	Pistons stuck in cylinders	Remove spark plug, put ½ pint oil and kerosene in each cylinder. Turn fly-wheel backwards, then ahead by starting crank Refill reservoir
	Lack of oil	
Clutch slips (cone)	Clutch. Too much oil on facing	Hold out with foot, wash off with gasoline, apply fuller's earth or powdered borax
Clutch grabs (cone)	Lack of oil on face	Hold out clutch and apply neatsfoot oil to leather facing; work clutch back and forth several times
Noisy clutch Pedal chatters under the foot	Lack of grease in cup Worn clutch collar, lack of oil	Refill cup and screw down once or twice Remove and replace with new; adjust and oil frequently

Gears noisy	Transmission.	
	Lack of lubrication	Drain old lubricant and refill
	Worn parts	Renew
Lubricant works out at ends of drive shaft	Poor felt washers	Remove and supply new washer
Lubricant works out around cover	Adjustment not tight	Tighten adjustments
	Poor gasket	Renew gasket
	Cover not tight	Tighten cover screws or nuts
	Universal Joints.	
Joints noisy	Lack of lubrication	Refill with grease through plug
	Parts worn	Replace with new
	Rear Axle.	
Gears noisy	Lack of lubrication	Drain, rinse with kerosene or gasoline and refill
	Adjustment too close	Readjust
	Worn parts	Renew
Oil leaks at brake drums	Oil tubes plugged	Clean out
	Washer worn, felt only	Remove and replace with new felt washer
	End play in axle	Adjust shaft at differential end
	Oil level too high	Drain at plug till level is reached
Bearing squeaks	Worn or broken bearings	Replace with new
	Lack of lubricant	Fill with steam cylinder oil through plug opening
	Brake Shafts and Rods.	
Work hard	Lack of lubricant	Supply all bearings and joints with medium engine oil and fill grease cups
	Springs.	
Squeaks	Dry at end of leaves and shackles	Supply grease or oil at all cups; lubricate leaves with graphite and oil or hot paraffine
	Steering Gear.	
Turns hard	Lack of oil	Supply with steam cylinder oil or light grease at plug or cup
	Adjustment too tight	Readjust
Turns too freely, considerable play	Worn	Renew worn parts
Squeaks in spark or throttle rods	Adjustment too loose	Readjust
	Dry, lack of oil	Supply oil around top of steering post or at hole at side of post or on wheel hub
Spark or throttle works hard	Adjustment too tight	Adjust
	Lack of oil	Supply oil
	Wheel Bearings.	
Wheel hub heats	Bearings tight	Readjust
	Lack of lubricant	Repack with grease
	Worn bearings	Renew

MECHANICAL SIDE OF AUTOMOBILE NOW INTERESTS WOMEN.

"Comparatively few automobile sales are now made in which a woman does not have a considerable amount of influence," says E. T. Strong, general sales manager of the Buick Motor Co.

"This fact was recognized some years ago, as veteran motor car dealers know, but at that time woman's interest in cars seemed to be centered chiefly in the closed models.

"And when she did express her opinion concerning one of the open models, it was usually along the lines of appearance, finish and refinements.

"For this reason there was a general impression in the industry that women were inclined to take the mechanical features of a motor car for granted, and the first move of the salesman was to land the woman buyer into the tonneau, invite her to be seated and call her attention to the comfort, roominess and luxury there.

"But since that time women have learned to drive—not merely a few here and there, but in great numbers. A great many women have cars for their own exclusive use. Others share a car with one or more other members of the family. And as a result of their driving women have been drawn more intimately

in touch with the mysterious forces and mechanism that give life and action to the motor car and today their interest in the mechanical side of the automobile is great.

"True, women are still very much taken up with beauty, convenience and comfort. For that matter, so are the male motorists. These are features that the motor car purchaser of today has a right to expect, particularly among the better makes of cars. But the salesman can no longer expect to sell a motor car to a woman driver without first satisfying her as to the performance and operation of the various mechanical units.

"The change is logical when it is analyzed. For after all the woman driver in many cases has had sufficient experience to know that motoring enjoyment depends to a great extent upon the right kind of mechanical equipment."

WE HAVE AS BAD ONES.

(From the Boston Post.)

The newspapers of New Jersey are commendably severe in their condemnation of the kind of grade crossing which at Salem Pike in that state was the scene of the killing of 14 persons in an automobile truck that was struck by an express train last Saturday night.

The death trap had no gate, no flagman, no warning bell and no special light,

and it was only 10 miles from Camden in a region of numerous villages.

We recognize the justice of the denunciation of such absolutely inexcusable menaces to the public safety, yet here in Massachusetts there are plenty of them with all the bad features of that Jersey crossing. The rural districts are full of them. To be sure, automobilists ought to use ordinary precautions at such places, and come to a full stop before crossing any unguarded tracks. But as they do not all do this, they should be given some protection, at least, from their own lack of caution.

The absolutely unguarded grade crossing is a disgrace to any railroad that permits one in these days of easily installed automatic electrical warnings. The state ought to compel the improvement of every one of them.

AUTOS KILL 104 PERSONS IN NEW YORK STATE.

One hundred and four persons were killed by automobiles in New York state in October. In Greater New York there were 59 killed. In New Jersey 17 were killed by automobiles. Six occupants of automobiles were killed in New York state and four in New Jersey at highway-railroad crossings during the month.

OFFERS GOOD ADVICE RELATIVE TO WINTER DRIVING.

E. B. Wilson, director of sale of the Buick Motor Co., gives the following advice upon winter driving:

"When driving in snow and sleet, and even in heavy rain, it is of course necessary to have the side curtains closed, for comfort. In this case, vision through the windshield is often seriously obstructed by the snow or rain on the glass. There are some patented windshield cleaners on the market that assist greatly in overcoming this condition, but if your car does not happen to be equipped with one of them, you can get around the difficulty by adjusting the windshield. Leave the lower half entirely closed and adjust the upper half so that it slants out enough to give you clear vision between the upper and lower glasses—an inch or two will suffice. In this way the snow or rain that beats in will not bother you to any extent.

"When the streets are slippery the safest practise is to use tire chains, particularly on the rear wheels. But should you be driving without them, be careful how you handle the brakes. Never apply the brakes suddenly under these conditions. The best method is to keep your foot off the clutch pedal, leaving the clutch in engagement, and then when you wish to apply the brakes, take your foot off the throttle, close the hand throttle entirely and apply the brake gradually. This causes the motor to help you slow down and keeps the pressure perfectly equalized on both rear wheels. Do not apply the power suddenly on slippery streets. Open the throttle gradually.

"If you happen to be driving down hill you can use the motor as a brake by shifting into second or first speed on steeper grades, then close the throttle. You will rarely have to use the brakes if you follow this method.

"When the road is slippery, summer or winter, always drive at such a speed that you can stop with reasonable quickness without the danger of skidding. You have always got to figure on 'the other fellow' and you never know what he is going to do. A car suddenly turning into the main thoroughfare from the side street, or a careless pedestrian who steps into your path from behind a car or other object beside the curb will make it necessary for you to act quickly to prevent accident, and you can do this if you have your car perfectly under control.

"It is more important to be able to stop your car than to start it and the careful driver will be guided by this rule.

"We solicit all Buick owners to observe the traffic rules to the letter. They are founded on good common sense in most cases, as are the rules governing 'courtesy of the road.' Know the streets and roads in your locality that have the 'right of way' and then do not, in all cases, be too insistent on maintaining your right of way. There is no safer or more pleasant mode of transportation than motoring. The most important rule to observe is: Keep your car under control at all times."

Automobile Dealers Urged to Support Kahn Bill

The National Automobile Dealers' Association has issued this bulletin:

"Newspaper accounts of probable action in Washington declare that the congressional leaders have discarded the plan for the free distribution of surplus army trucks to the Agricultural Department and that the new program calls for the sale of these trucks by the War Department.

"Because of a difference of opinion between the War Department and the attorney general's office over the interpretation of an appropriation bill, the secretary of war held up the distribution of these motor vehicles to the Agricultural Department and asked for Congress to pass additional legislation which would express the intent of Congress as to what he should do with these vehicles. Accordingly Representative Kahn of California introduced a bill directing the secretary of war to complete the transfer to the Agricultural Department. There was suggested to the Military Affairs Committee, also to which the Kahn bill was referred, a report by the Bureau of Public Roads, asking for amendment to the Kahn bill.

"It is our opinion that the Kahn bill offers a relief for a rather dangerous situation and we respectfully urge our members to write to their senators and congressmen and to telegraph to them asking for passage of the Kahn bill."

GIRL BECOMES ADVERTISING MANAGER FOR ESSENKAY.

Miss Theresa Hegeley, 21 years old, has been appointed advertising manager of the Essenkay Products Co., 222 W. Superior street, Chicago. When 17 she began her business career as a stenographer with the company. Her keen, wide-awake mind and ability to grasp business problems and solve them won quick recognition. She became secretary to the president and later secretary to the sales manager.

"I have some definite ideas regarding advertising copy," said Miss Hegeley. "I believe that illustrations must not only illustrate the text, but must be a part of it. Text and pictures must speak one language and form one completely rounded salesman's message. I see a lot of advertisements in magazines that cost from \$5000 to \$9000 a page with pictures that are merely pretty and decorative, but have no direct bearing on the text."

AERONAUTICAL EXPOSITION.

Airplanes for commercial use and pleasure will be displayed in the Coliseum, Chicago, at Chicago's first aeronautical show during the week of Jan. 8.

DREW PUBLICITY DIRECTOR.

Putnam Drew has become publicity director of the Rainier Motor Corporation, New York.

BOSTON SHOW OFFICIALLY SANCTIONED BY M. A. M. A.

The Motor and Accessory Manufacturers' Association has officially sanctioned the 18th annual Boston automobile show for passenger cars, commercial vehicles and accessories, to be held at the Mechanics' building, Boston, March 13 to 20, 1920, inclusive. Approximately 105,000 square feet of floor space are available for exhibition purposes, and the show next year is expected to surpass all previous records.

In announcing the sanction granted by the board of directors, M. L. Heminway, general manager of the association, expressed the opinion that the forthcoming automobile shows at New York, Chicago and Boston would be the greatest in the history of the automobile industry.

"This is not merely an optimistic prediction," said Mr. Heminway, "but a statement of fact based on the official records and applications for space already in hand from the various parts and accessories manufacturers. Never was the interest in the national automobile exhibitions so keen. Never was the demand for space so great. This is, of course, an index of the general conditions of the automobile industry.

"Preliminary reports received from manufacturers of motors, parts and accessories indicate that many important improvements, particularly in the direction of making passenger cars easier to operate, will be exhibited. Many automotive equipment manufacturers are making a special point of the fact that their new accessories, and improvements in their old accessories, will greatly simplify the operation of machines for women.

"The simplification of design seems to be a rather marked tendency. Manufacturers are also emphasizing these accessories and those modifications in construction which will simplify driving of machines under winter weather conditions."

NEW AIR COOLED MODEL IS BEING PLANNED BY CAMERON.

With the return of Everett S. Cameron to passenger car manufacturing there is brought back to the field a winner of other days. Mr. Cameron is a veteran among car makers, having made his first car in 1898, when he produced a steam car with shaft drive. His 1900 model was a single-cylinder gasoline car and was equipped with the single universal joint system, transmitting the power to the rear axle with the driving shaft encased in a large radius tube.

The Cameron Motors Corporation has been strongly organized to manufacture on a large scale at West Haven, Conn. Several factories are already in operation preparing for an output of the Cameron air cooled car. Mr. Cameron believes that the era of the air cooled car has arrived.

RAISE HUPP PRICES.

Hupp touring and roadster models are now \$1452. The sedan and coupe prices have been made \$2185.

Lawrence Process of Repairing Scored Cylinders

Large Business Has Been Developed and Much of the Work Is Done for Automobile Concerns Throughout the Country --- Successful Suits Against Infringers

IT IS well known that a great many cylinders of internal combustion engines are damaged by wear and very often they are scored by foreign matter getting into the cylinder or by parts of the apparatus becoming disarranged and scratching or gouging the interior of the cylinder so that there is no tight fit between the piston and the cylinder, and thus causes poor compression and the engine soon becomes useless. The scoring is very often caused by reason of a wrist pin coming loose and being carried along by the piston and scraping the interior wall of the cylinder so that it becomes channeled or scored.

It has heretofore been the practise to repair scored cylinders by grinding or re-boring them. This is a very slow method and is expensive because of the time required for the purpose, and such manner of repairing necessitates the use of a new size piston and ring. Also each time a cylinder is reground it is weakened and the wall of the bore is made thinner.

Another method has been to weld the scored parts to the cylinder, but in subjecting the cylinder to a welding heat the same becomes warped, and, therefore, in the majority of instances, requires grinding or re-boring, and again disturbing the contour of the inside of the cylinder wall.

L. Lawrence & Co., owner of the patents covering the process of repairing scored cylinders, with main offices in the Woolworth building, New York City, began business at Newark, N. J., in 1862, making copper work for manufacturers.



Pittsburgh Plant of L. Lawrence & Co., Owner of the Lawrence Patented Process for Repairing of Scored Cylinders. Main Offices of the Company Are Located in the Woolworth Building, New York City. In Addition to 12 Branch Plants, the Company Has Representatives in 76 Cities. Special Prices Are Made to Automotive Dealers. The Company Plans to Build Up a National Organisation for the Sale of Automotive Accessories.

This company also is the owner of patents covering the repair of sand holes and blow holes in rough castings, and is doing a large volume of this work for well known automobile concerns and foundries throughout the states.

History of the Company.

The head of the firm invented the Lawrence patented process for repairing scored cylinders in 1915 and the business grew so fast that it was necessary to open a branch plant at Detroit, Mich., in May, 1916. Right after the Lawrence company exhibited in the 1916 automobile show at the Coliseum, Chicago, a branch was established in that city.

A branch plant was opened at Cleveland in 1917. On the Pacific coast the demand for the Lawrence service has required the concern to establish plants at both San Francisco and Los Angeles.

The Chicago plant has been getting so much work from the Wisconsin, Minnesota and Northern Michigan territory that plants have recently been opened at Milwaukee and Minneapolis. This was done to avoid the shipping delays getting cylinders in and out of Chicago. Every winter the Chicago plant has repaired a great many cracked water jackets and scored cylinders for dealers in Wisconsin, Minnesota and Northern

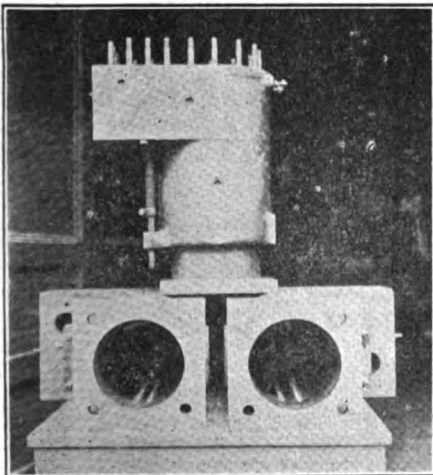
Michigan, and the Milwaukee and Minneapolis plants will shorten the time required for repairing.

Suits brought by the company against infringers of its patents have been won in several states. The firm makes special prices to automotive dealers who send scored cylinders in to be repaired and this policy has been largely responsible for the rapid growth of the business.

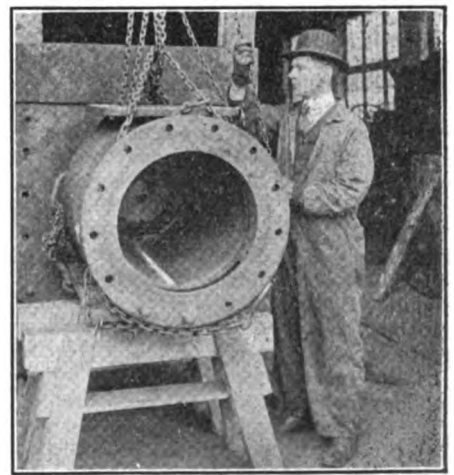
The greatest care is taken to finish all work so carefully that there are no "come backs" on the firm's policy of guaranteeing all work for the life of the motor. New mechanics who are learning the process are never permitted to finish a job alone until they have had sufficient experience and practise. The Lawrence officials realize that money spent in thoroughly training the mechanics saves both trouble and time later on.

The Lawrence company, outside of its 12 branch plants, is represented by responsible persons in 76 cities throughout the states, and before this year is over, with the aggressive campaign which is now in progress, will be represented in every city and town of any size throughout the country. At least this is the aim of the organization.

The Lawrence organization plans to build up a national organization for the sale of automotive accessories, and, with its branches and representatives throughout the country is in an excellent position to carry on this business in conjunction with their other work.

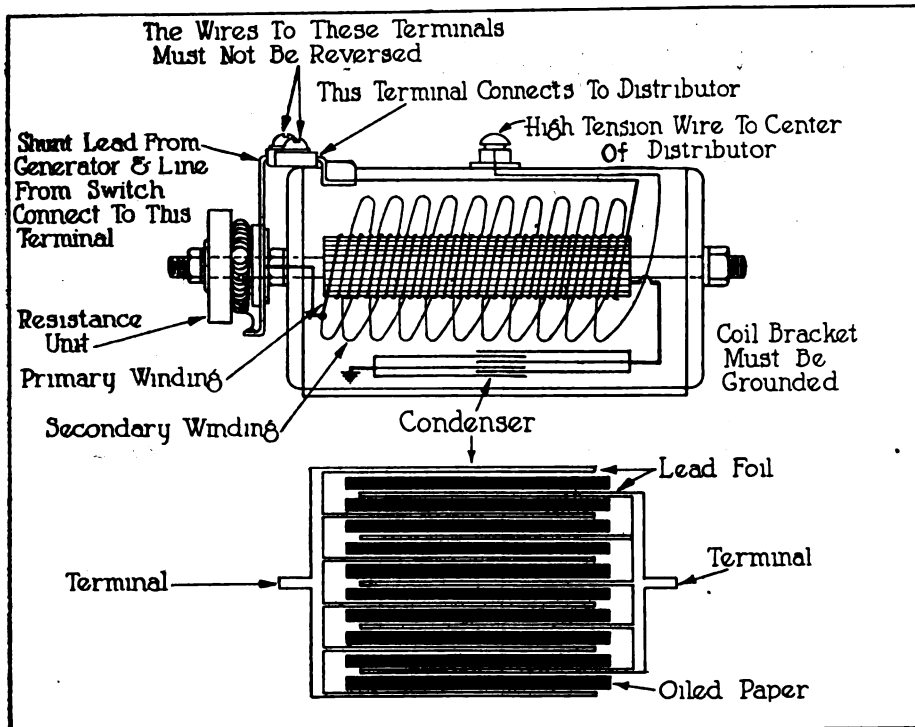


Cylinder Block Repaired at Newark Branch.



Steam Cylinder Repaired at Newark Branch.

EXPLAINING THE CONDENSER AND MANNER OF TESTING IT.



Sectional View of Delco Coil and Condenser, Showing in Detail the Construction of a Condenser and the Connections of the Condenser in Relation to the Coil.

THE condenser is found connected across contact points of breaker mechanism. Its use is to prevent the contact points from burning and pitting and to assist the coil to increase the voltage in the secondary windings.

In construction it comprises strips of tinfoil, insulated from each other by oiled paper. Half of these tinfoil strips are connected to one terminal and half to the opposite terminal. Current cannot flow through the condenser, but the condenser has the property of absorbing a certain amount of electricity and building up the voltage.

Defective condensers not only cause the points to pit rapidly, but also cause the ignition system to work poorly, or, more likely, not at all. A test of the condenser is therefore necessary.

Testing Apparatus.

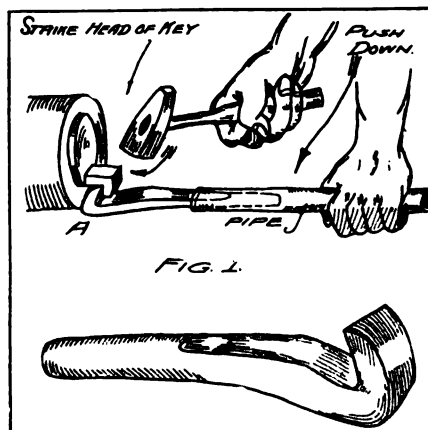
The testing apparatus consists of a 16-candlepower carbon lamp connected to a 110-volt direct current line. The condenser is connected to the two leads and the ends of the wire snapped together. If the resulting spark is hot, fat and cracks with a good sharp report, the condenser is all right. If this does not happen, junk the condenser and purchase a new one.

This test may be made with alternating current, with 110 volts, in the same manner. The test is, however, a little more difficult. By trying the alternating current test a few times on a condenser known to be defective and one known to be right, the repairer will be able to use the alternating current satisfactorily.

The testing outfit described for the condenser test will be found invaluable in making all sorts of electrical tests, for short circuits, grounds and open circuits.

This Key Extractor is Easily Made

Tools for removing keys from the hubs of pulleys, wheels, etc., may be made in the shop in spare time. Take a bar of steel or Norway iron about 14 inches long, either round or square, and heat it in the forge and form the end into a hook about two inches long with the end beveled as shown at Fig. 1. To use this tool, place the beveled end of the hook back of the projecting arm of the key. Place a length of pipe over the small end of the tool, the shoulder of the tool bearing against the hub of the gear or wheel. With a hammer strike light blows on the key, at the same time bearing down on the lever. Keys that seem impossible to withdraw may be removed easily with this tool.



Another tool for this purpose is shown at Fig. 2. It consists of a bolt heated in the forge and hammered flat, the end upset. The slot is cut by punching while hot and filing to shape after it is cooled in a vise. To use the tool the slot is slipped over the arm of the projecting key, the bolt is passed through a flat piece of stock and two pieces of pipe or blocks of wood of equal length placed at the side. A nut is fitted to the bolt and the nut turned down with a wrench. The power exerted at the nut will easily pull the key.

DRILLING GLASS.

The car owner who finds it necessary to drill holes in glass will succeed if he uses the following method: Grind the points from one corner of a small three-cornered file on the bias from the other. Place this in a bit such as is used in wood work. Place the glass to be bored on a smooth surface covered with a blanket of similar material. Begin to bore the hole exactly as if the substance were wood. When a slight hole has been made surround this with putty and fill the dam thus created with turpentine to prevent heating. Do not press too hard on the drill in boring.

LOCKING NUT.

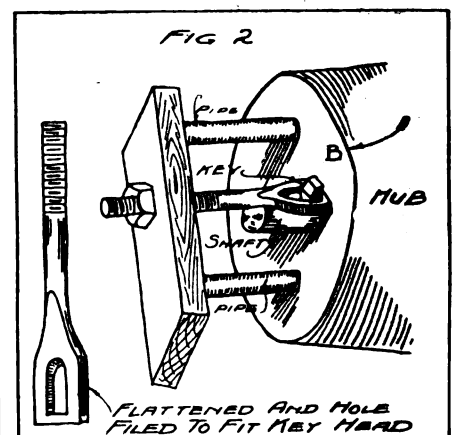
It is easy to lock a nut securely by having the bolt a little longer than is needed and then rivet the projecting end a little after the nut is screwed in place. When the nut is to be removed it is necessary to file off the riveted part.

DON'T USE A REAMER.

Never use a reamer on the inside of a pipe. The scale inside a pipe, caused by the flux used in welding or brazing, is as hard as glass and will turn the edge of any reamer that was ever made.

PIPE JOINT CEMENT.

A mixture of 10 parts of iron filings with three parts of chloride of lime mixed to a paste with water makes an admirable pipe joint cement. The mixture is applied to the joint and the clamp and becomes solid in 12 hours.



Illustrations Show How This Home Made Key Extractor Is Constructed. Read the Accompanying Text for Detailed Instructions.

CLEVELAND AUTOMOBILE SHOW TO BE BIGGER THAN EVER.

The 19th annual Cleveland automobile show will take place in Wigmore Coliseum, Jan. 17-24. Thirty thousand feet of floor space has been added for the 1920 show, which is expected to prove the biggest yet. The show will be under the direction of the Cleveland Automobile Show Co., with the sanction and co-operation of the Cleveland Automobile Club. There will be increased space for accessories. Fred H. Caley, Hollenden Hotel, Cleveland, is manager. The show will be opened Saturday noon, Jan. 17, and will be open Sunday. An announcement for the exhibition states: "Ohio is the greatest automobile market in the Union. Actual figures show Ohio has passed even New York in motor car ownership, and this means that Ohio presents the most brilliant market for the distribution of accessories, parts and supplies."

SAYS DEVICE ELIMINATES SPARK PLUGS AND CARBURETORS.

Clyde B. White, a young mechanic employed in the Rome, N. Y., Brass Works, has invented a device, known as an electric vaporizer, which, it is claimed, eliminates not only spark plugs, but also the carburetor in automobile engines. He recently sold his patent rights to a Buffalo concern, receiving \$35,000 in cash, \$20,000 in stock in another industry controlled by the Sager Co., the purchaser, and a royalty of \$200 a month. In a test with a six-cylinder standard engine, it is said, 63 miles were obtained on a gallon of gasoline, and with a four-cylinder engine 90 miles was the total.

KENWORTHY LEAVES ROAMER TO HEAD NEW CORPORATION.

C. T. Kenworthy, having sold his interest, has resigned as vice president and general manager of the Roamer Motor Car Co., a position he has held for the last three years, and has accepted the presidency of the Kenworthy Motors Corporation, which is being organized under the laws of Illinois. Men prominent in the industrial and financial world are associated with Mr. Kenworthy, who is to be president and general manager of the company.

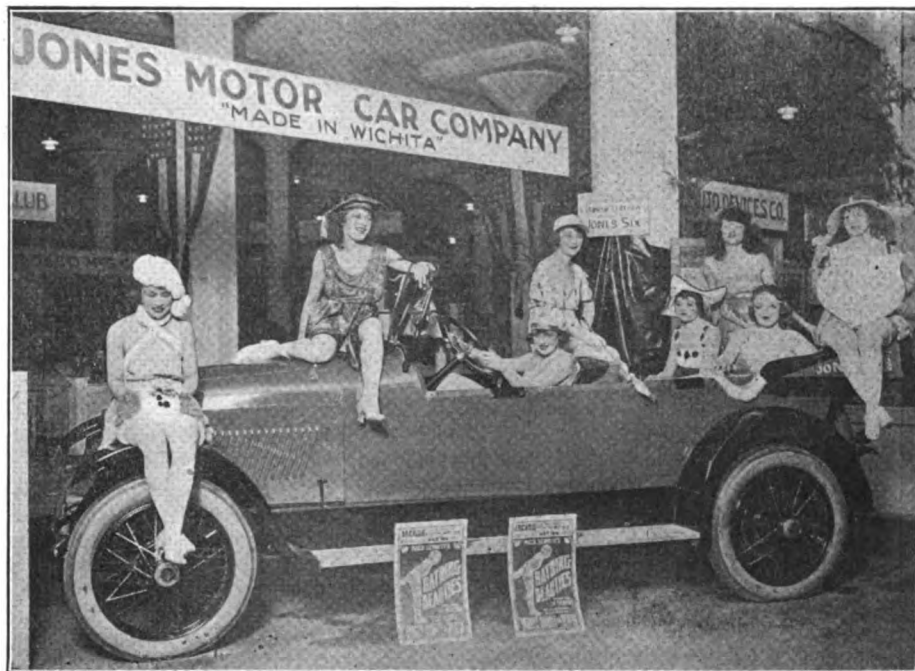
STUDEBAKER'S EXTRA DIVIDEND.

The Studebaker Corporation has declared the regular quarterly dividend of 1½ per cent. and an extra dividend of 2½ per cent., making total dividends declared this year seven per cent. on the common stock. President A. R. Erskine states that net profits of the corporation for the third quarter, after deduction of \$2,000,000 reserves for federal taxes and contingencies, were 11 per cent. net on the common stock, or at the rate of \$44 per annum.

KING BUYS PIERCE-ARROW.

King Albert bought a Pierce-Arrow 48-horsepower dual valve six to take back to Belgium with him.

THESE DAINTY LITTLE MERMAIDS FORSAKE WATER FOR AUTOMOBILE



Diving Girls Right at Home in New Jones Six.

THE new Jones six four-passenger speedster made its debut at the recent International Wheat Show at Wichita, Kan., and Mack Sennett's eight "Bathing Beauties" commandeered the car for photographic purposes in lieu of a natatorium. "The luxurious upholstery of the Jones Six," said the mermaid chauffeur, "is much more comfortable than the

contents of an outdoor swimming pool in cold weather." The Jones six new models and prices are: Two-passenger roadster, four-passenger roadster, five-passenger touring car or seven-passenger touring car \$2250; four-passenger speedster type, \$2350; five or seven-passenger touring car with Victoria top, \$2350; two-passenger "Oil Field Special," \$2000.

CHRYSLER LEAVES GMC TO ENTER BUSINESS FOR SELF.

W. C. Durant, president of the General Motors Corporation, has issued the following statement: "The resignation of Walter P. Chrysler, acting vice president in charge of production and member of the board of directors of the General Motors Corporation, is confirmed. It is understood that Mr. Chrysler intends to engage in business on his own account."

WARNING IN BELMONT.

Motorists are warned that all families in that section of Belmont, Mass., known as the "Stone Estates," located in the area bounded by Stone road, School and Orchard streets, have been organized as a vigilance committee, pledged to report every case of speeding in that district. The entire neighborhood has been aroused by the death of a 10-year-old boy who was recently run down and killed by an automobile near the intersection of Orchard street and Stone road. The numbers of several cars have already been taken and reported to the local police and to the highway commission. The locality is a dangerous one, as the streets are narrow, with several blind corners, and there are many children in this district. There is no reason why any mo-

torist should make a through route of this district.

MOTOR THIEVES TURN GHOULISH AND STEAL AUTO HEARSE.

London has been suffering from a plague of motor car thieves. For the last few weeks no car has been safe. The thieves have now taken a ghoulish turn of mind. They broke into an undertaker's garage and stole his six-tasseled, black-shrouded motor hearse. The thieves have not been captured and the undertaker is offering a reward of \$250 for the return of the hearse.

BIG BEARINGS MERGER.

All the Marlin-Rockwell properties engaged in the production of S. R. B. bearings have been combined into a new operating organization, known as the Standard Steel and Bearings, Inc.

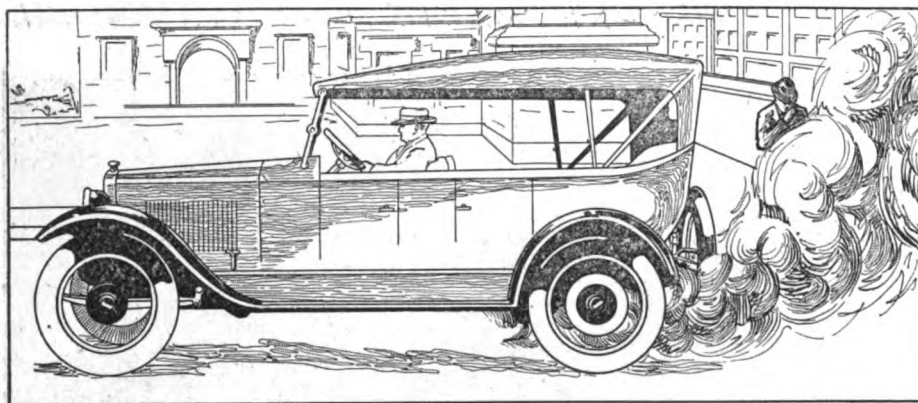
NEW YORK BUS LINES.

Motor bus lines are proving so popular in New York City that several new ones are being started.

BUFFALO SHOW.

The Buffalo automobile show takes place the first week in March.

VIGILANCE WILL ELIMINATE MUCH OF AUTOMOBILE SMOKE NUISANCE



Some Cars Imitate a German Gas Barrage.

IN MANY cities the police are paying strict attention to "smoking" cars.

There are many cases where it is difficult to control the issuance of smoke, but vigilance should be aimed at making whatever corrections are possible. Much of the smoke comes from too much lubricating oil being supplied to the engine.

This may come from having the reservoir too full, that is with oil above the level indicated by the manufacturer. The remedy would be to draw off the surplus. But the fault may be in the construction, with too much oil fed to the engine even when the reservoir level is normal. This means lowering the level by altering the splash troughs, or narrowing the dippers so there will be less splash.

In some cases it may be found that the cylinders have worn or that the piston rings may be gummed with carbon deposit mixed with oil, or they may have lost their original spring. All these things will permit a large amount of oil to work up into the combustion chamber to burn and cause carbon deposit and smoke.

The remedy is to have the cylinders rebored or ground and new pistons fitted; or it may be possible to correct the trouble with special piston rings which take up the wear and keep the excess of oil from the cylinders; for gummed rings cleaning alone is necessary.

At Low Throttle Opening.

Most of the trouble with oil comes when driving at low throttle opening. When touring there is likely to be very little smoke, as the engine is run with fairly wide throttle most of the time. When this same car enters the city, where there must be much throttling down, there may be trouble with smoke. The reason is that with a closed throttle the gas drawn in does not fill the vacuum in the combustion chamber and this draws oil past the pistons. The same thing comes when the engine is running idle at the curb for some time, as the chauffeur puts it, "pumping oil."

The trouble is likely to occur more in cool weather than when it is warm and vaporization is perfect, for the engine is more often kept running so it will not cool too much or freeze. Running idle also causes the carburetor to load

up, and dense black smoke is the result when the engine is started.

Black and Blue Smoke.

Smoke caused by excess of gasoline may be distinguished by its being black, while that from excess oil is blue, and there is always steam issuing from the exhaust and as soon as it strikes cool air it is white. One of the products of combustion in the cylinders is water, which is vaporized and passes out with the exhaust, becoming steam.

One of the products of combustion is carbon monoxide, which is deadly, and there are other gases which are particularly objectionable, as every one knows who has walked the city streets. It is easy to detect the car which is extra offensive, for not all give off great volumes of fumes which choke and tickle the throat and make one think harsh things if not actually say them. Not all, but much of these excess fumes might be prevented by a proper adjustment of the carburetor and proper instruction in driving.

UNUSUAL GUARANTEE ON STEWART WIRE WHEELS.

The Stewart Wire Wheel Corporation, Frankfort, Ind., manufacturing wheels for Ford and Chevrolet cars, is giving the following guarantee with each set of wheels sold: "Every set of Stewart wire wheels and parts is guaranteed for one year. Should the material or workmanship prove defective, or should any breakage or damage (except to enamel) be sustained in an unavoidable accident during that period, the wheels or parts thereof will be replaced by us without charge to the original purchaser." This somewhat radical departure in the way of a guarantee not only protects the motorist against breakage due to defective workmanship or material, but it also assures him that if he equips his car with Stewart wire wheels he is certain, under the guarantee, of one year's continuous enjoyment of the service, pleasure and comfort that these wheels give. Under the guarantee the wheels will be repaired or replaced without charge in the case of an unavoidable accident, even if there is no fault

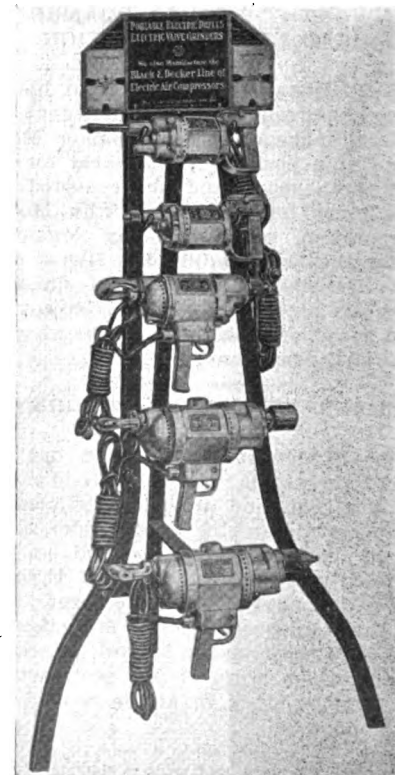
or liability on the part of the manufacturer. Motorists who have suffered broken or damaged wheels on rainy days and wet, slippery streets, will appreciate the liberal guarantee of service which the Stewart firm is giving. The Stewart guarantee virtually carries with it a paid-in-full accident insurance policy for one year.

METZ REPRESENTS BURD IN IOWA.

W. H. Metz, former representative of the Burd High Compression Ring Co. in the Detroit district, but for the past year and a half in the government service, has been appointed district agent for the State of Iowa with headquarters at 704 Polk building, Des Moines, Ia. His past experience in selling Burd High Compression Piston Rings and his work during the war, which was largely along piston ring lines, have given him a splendid training and he will undoubtedly make a big success in the Iowa territory.

BLACK & DECKER MANUFACTURING CO. HAS NEW DISPLAY RACK.

The Black & Decker Manufacturing Co., Towson Heights, Baltimore, Md., announces a new display rack. This is an elaborate metal rack, crowned with a colored enameled sign. It carries a Black & Decker electric valve grinder and four different sizes of Black & Decker portable electric drills. These racks actually cost the company \$11 each. They are given to stock jobbers in order that they may display these tools prominently in their stores.



Elaborate New Display Rack Furnished to Jobbers by Black & Decker.

LET AUTOMOBILE HIT YOU AND YOU "WIN" THE CAR.

How a state law is being used to "bleed" automobile owners was disclosed at the directors' meeting of the National Automobile Dealers' Association in Denver, Oct. 1-4 by George D. McCutcheon of Atlanta, southeastern director for the association. McCutcheon called attention to the fact that in both North and South Carolina there is a law providing that wherever an automobile injures a pedestrian or other person by collision or otherwise, the person so injured may institute a suit for the forfeiture of the vehicle.

This law has been taken advantage of very curiously. The courts have ruled that anyone driving an automobile with the owner's consent stands in the same relation before the law as the owner. Under this interpretation chauffeurs take out expensive, high powered automobiles, and having previously conspired with unscrupulous persons, have accidents in which pedestrians are run over and injured, though seldom seriously. Instead of buying an automobile or stealing it, the "prospect" in North and South Carolina is now going out, spotting the car he wants and permitting it to run into him.

So serious has this situation become and so dangerous to the automobile owner that the National Automobile Dealers' Association passed a resolution denouncing the law and pledged its support to the newly formed bi-state trade association in the Carolinas that when the legislatures next meet the national association support will be given to the local dealers to obtain the repeal of these statutes.

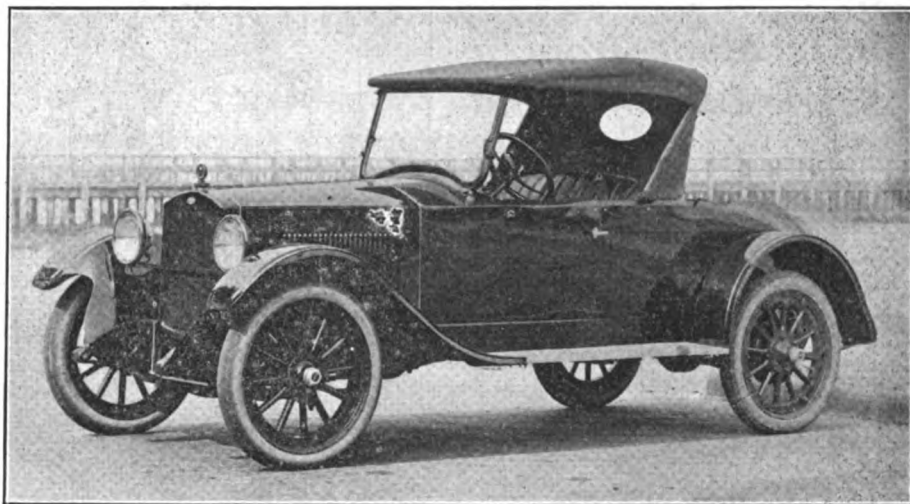
NEW YORK AIR BRAKE TO MAKE MOTOR CARS.

The New York Air Brake Co. is arranging to manufacture motor cars, as well as trucks and will soon be engaged in this new line on an extensive scale. The company's first motor trucks were recently turned out, and they are being produced in small numbers now, but it is planned to increase the output eventually to 20,000 annually.

LONG ISLAND MAN HAS FORMER CAR OF KAISER.

An automobile built especially by Krupps for the Kaiser and used by him behind the German lines in the big drives of the spring of 1918, is in Patchogue, Long Island, N. Y., in a repair shop, where it is being restored to its original condition for the present owner, George E. Crater, a retired American capitalist, who has a home near Yaphank, L. I. The car was abandoned by the Kaiser during the German retreat, and its top, fittings and upholstery ruined by a bomb dropped near it by an aviator. The Kaiser's chauffeur drove the car to a point on the Swiss border, where it was acquired by Mr. Crater after the armistice and sent to this country. Photographs obtained from Krupps are being used in the

NEW GRANT ROADSTER SUGGESTS ARTISTIC HARMONY OF LINES



New Grant Roadster Is Real Beauty.

EVERYTHING about the new Grant light six roadster suggests artistic harmony of lines. Like the touring car, this roadster has long, low, straight lines and the new style radiator gives the Grant light six a distinctive appearance. This model is built upon the same chassis as the touring car and has the same powerful, flexible motor. The roadster seats three persons comfortably

with plenty of leg room. Cushions are deep and of real leather, hand buffed. The exclusive Grant spring suspension provides the ideal Hotchkiss drive, springs riding nearly flat when car is loaded. These springs have self-oiling bushings, permanently lubricated. Equipment for the roadster includes top of "never-leak" fabric with door opening curtains, Boyce motometer and Kellogg power tire pump.

restoration of the machine. The car has a minute kitchen under the driver's seat, equipped with a small blue flame stove, cooking utensils and plate. It is equipped with porcelain, enamel and silver plumbing, running water, a drinking fountain and a reading lamp. A strip of plate glass 18 inches wide runs around the whole car level with the eyes of the passengers, so that their views in every direction is unimpeded.

CLEAR VISION.

To secure a clear view ahead through the glass of the windshield in rainy weather is vitally important to the safety of the motor car and its occupants. Many schemes are used to keep the glass clear in wet weather, but perhaps the old fashioned alcohol and glycerine mixture which is carried in a small bottle and rubbed on the glass as needed is best. If the bottle containing the solution is wrapped in a cloth and stowed in the side pocket it will always be ready for use and a cloth to apply it with will be at hand.

STUTZ ORGANIZES NEW MOTOR CAR COMPANY.

Harry C. Stutz, founder of the Stutz Motor Car Co., has perfected a new organization to be known as the H. C. S. Motor Car Co., which will be capitalized at \$1,000,000. Preparations will be made shortly for the erection of a factory at Indianapolis. Mr. Stutz, who is majority

shareholder in the new company, is president and managing director and also chairman of the board.

FEDERAL CRIME TO CROSS STATE LINE WITH STOLEN AUTO.

The National Motor Vehicle Theft law is now in effect and it is a federal offense, punishable by a fine of \$5000 or a prison term up to five years, to steal an automobile in one state and drive it into another state. For the first time the automobile has been recognized by Congress as being a part of interstate commerce and entitled to federal protection just like railroads, steamboats and bridges. The national act is the measure sponsored by the National Automobile Dealers' Association. Last year in only 21 cities more than 37,000 automobiles, valued at more than \$28,000,000, were stolen. About 5000 were recovered.

SANCTIONS BOSTON SHOW.

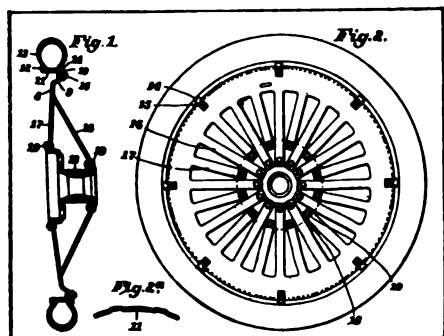
The Boston automobile show, to be held March 13-20, has been sanctioned by the Motor and Accessory Manufacturers' Association.

NEW MAIBOHM SIX.

The new Maibohm Six is finished in green and the equipment is said to make it one of the easiest riding cars on the market. It weighs 2395 pounds. The price is \$1395.

PRESSED STEEL WHEEL DESIGNED TO BE USED ON THE AUTOMOBILE

*Exclusive of the Hub,
It Is Made from a
Single Disc of Metal
—Said to Be Light in
Weight and Resilient*



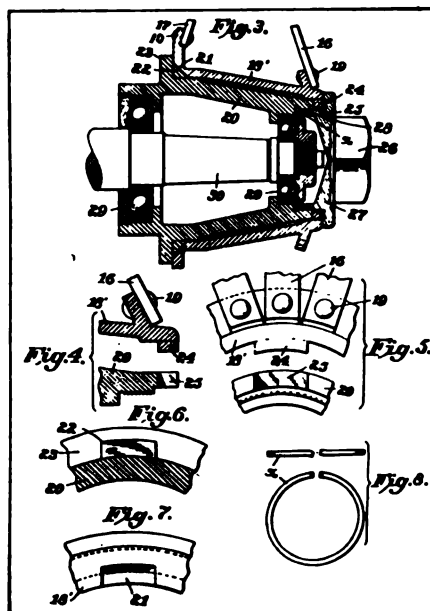
The foregoing illustrations show in detail the various features of a pressed steel automobile wheel designed by L. M. Ricketts. The numerical references are explained in the accompanying text. Mr. Ricketts states that definite plans for manufacturing have not been formulated, but are now under consideration.

L. M. RICKETTS, 3624 Roland avenue, Baltimore, Md., has invented a pressed steel automobile wheel, which, exclusive of the hub, is pressed from a single disc of metal. Mr. Ricketts states that it is strongly constructed, light in weight and resilient, and that, by means of projecting bosses on the outside of the rim, absolute concentricity is obtained. He says:

"The complete wheel can be changed or only the demountable rim and tire. This is both a demountable wheel and demountable rim. The cost of this wheel compares favorably with the wood wheel, and much cheaper than the wire wheel. The increasing shortage of suitable timber for manufacturing wood wheels puts the situation squarely up to the manufacturers of steel wheels. It is not the popularity of the wire wheel that is causing the increasing use thereof, but absolute necessity."

In the accompanying illustrations figure 1 is a section view of the wheel, figure 2 a side elevation of a portion of the wheel, figure 2A a detail, figure 3 a section view of the hub with a portion of the wheel in place thereon, figure 4 a portion of the wheel and a portion of the hub which interlocks therewith, figure 5 a face view looking at the parts of figure 4 from the right hand side thereof, figure 6 a detail view of a portion of the hub and figure 7 a detail view of a portion of the shell of the wheel. Figure 8 shows in two views a split locking washer.

In figure 1, 8 indicates the body of the wheel, which is formed of sheet metal, this body portion consisting of an annular portion arranged in a plane substantially at right angles to the axis of the wheel and a portion, 9, continuous with the portion 8, but extending at an angle laterally from the plane of the



portion 8, this annular portion being curved at 10 and merging into an overhanging pin portion, 11, which is arranged substantially central over the annular body part, 8, and is provided with a flange, 12, at its terminal edge.

The edge of the rim, 11, opposite to the edge at which the flange is located is devoid of a flange and this enables a demountable rim and tire, 13, to be slipped in place and held by clips, 14, which are retained by bolts, 15, passing through the angular extension of the annular body. The body portion 8 is formed continuous with spokes 16 and 17. These spokes are cut from the body of the metal and one series, 16, extends to the right in figure 1 and the other series ex-

tends to the left. These spokes alternate with each other and their lower ends are connected with the right hand and left hand ends of the hub or shell, 18, by any suitable means such as by the rivets, 19.

The arrangement is such that the rim of the wheel is substantially over the larger inner end of the hub. In figure 1 the spokes 17 are in plane substantially at right angles to the axis of the wheel, though these spokes may be inclined to a sharper degree than illustrated in figure 1.

In figure 3 is shown the wheel shell or center, 18, mounted on the hub, 20, so as to turn with said hub as one body therewith. For this purpose the shell is provided with a notch or cut out portion, 21, which fits over a fillet, 22, on the hub, adjacent the flange, 23. The outer end of the shell is provided with an inwardly extending projection, 24, which fits into a notch, 25, in the hub and thus the shell is held against circumferential movement in relation to the hub. The shell is held against axial displacement in relation to the hub by a nut, 26, which has a base or flange portion, 27, lying over the end of the shell and restraining it against axial displacement. The nut is screw threaded at 28 into the end of the hub. Roller bearings are provided at 29 between the hub and the axle.

In figure 3 is shown the wheel shell or center mounted on the hub so as to turn with the hub as one body therewith. For this purpose the shell is provided with a notch or cut out portion, 21, which fits over the fillet on the hub, adjacent the flange, 25.

The outer end of the shell is provided with an inwardly extending projection, 24, which fits into a notch in the hub and thus the shell is held against circumferential movement in relation to the hub. The shell is held against aerial displacement in relation to the hub by a nut, 26, which has a base or flange portion, 27, lying over the end of the shell and restraining it against aerial displacement. The nut is screw threaded at 28 into the end of the hub.

Have They Tagged Your Auto Yet?

The number of this car has been taken as the car has been left on the street in violation of the Traffic Regulations.

Call at the Cadet Armory, corner Columbus Avenue and Arlington Street, between 9 a.m. and 12 noon.

Date _____

No. 1521

Car Number _____

Make _____

Date _____

Time _____

Place _____

No. 1521

DETAILS OF VIOLATION ON BACK

When the Police in Many Cities Find an Automobile Left Standing in Violation of the Traffic Ordinances, They No Longer Wait for the Owner or Driver to Put in Appearance. They Simply Put a Tag Summons on the Car. Above is a Likeness of the Tag Used by the Military Police in Boston.

Spring Lubrication Is Essential in Easy Riding Car

Proper Care Is Important for Both Passengers and Mechanism—Most Thorough Method Is to Remove Spring Completely and Take It Apart

WELL lubricated springs make an easy riding car, a matter as important for the passengers as for the mechanism, and, therefore, they should not be neglected. There are several types of springs in use named from their shape. The full elliptic has the general outline of an ellipse. The three-quarter elliptic and the semi-elliptic explain themselves. The platform type is an arrangement of three semi-elliptics supporting the rear end.

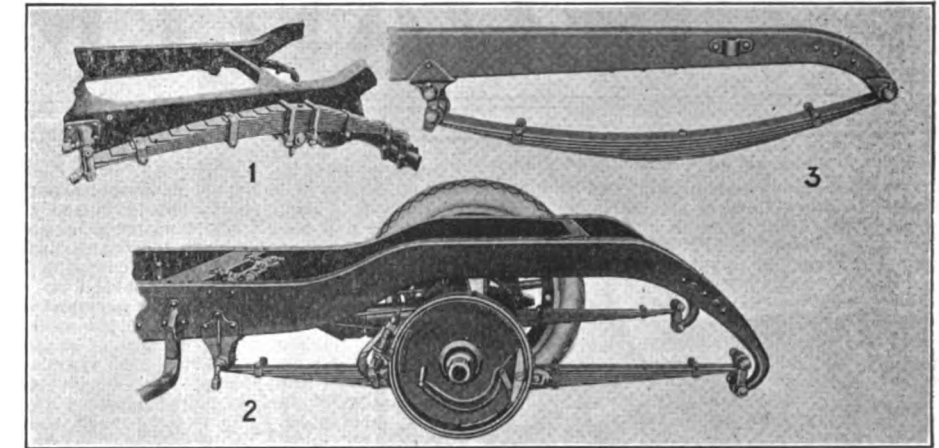
The cantilever is a form of curved spring fastened to the rear axle and the frame with the curved side down. The push of the rear wheels is transmitted in this and some of the other types through the springs. All of those mentioned are of the flat leaf type, a number of leaves being fastened together to give the proper strength.

These leaves work back and forth over each other as the frame moves up and down. There is a great deal of pressure between the leaves, particularly at the ends, and so they must be lubricated. If this is not attended to the car will not ride so easily and the springs will squeak.

Thorough Method.

The most thorough method of lubrication is to remove the spring completely and to take it apart. Jack up the frame to take the weight off the spring, remove the bolts holding it in place, drive the pins out of the shackles at each end and lay spring on a bench. Remove bolt holding spring leaves together.

To prevent the leaves from flying apart



1. Cantilever Spring; 2. Semi-Elliptic Rear Spring; 3. Semi-Elliptic Front Spring.

hold them by means of a "C" clamp or put the spring in a vise. After the bolt is removed release the leaves gradually.

If they are slightly rusty they may be touched up with emery cloth, but if they are badly rusted the rust must be removed with a file. Use graphite grease as a lubricant. Oil will run off and squeeze out, whereas the graphite grease fills up the minute pits in the steel and feeds it out as needed. Graphite tends to smooth over rough surfaces by filling the pits with a solid lubricant.

Cover with Grease.

Cover both sides of each leaf with grease. Then run a rod through the holes in the leaves and draw them to-

gether with a "C" clamp or vise. If the holes are not lined up by means of a piece of metal passing through them it will be impossible to replace the bolt.

Secure the bolt firmly and replace the spring on the car. This method of lubrication has the advantage of stopping any squeaks which may tend to develop at the center where the bolt holds the spring together.

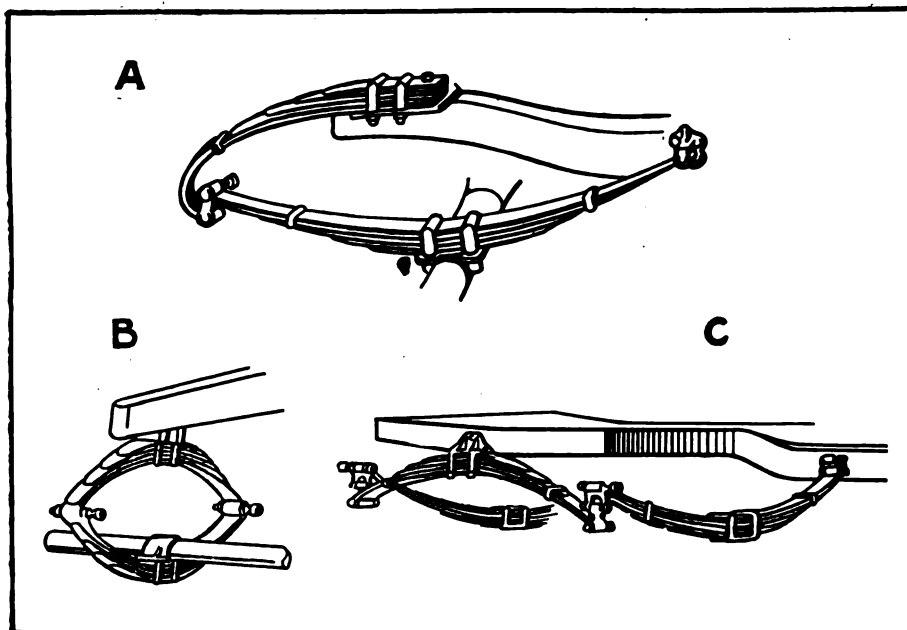
A quicker method, but one that is not so thorough, is to pry the leaves apart. After cleaning with a stiff brush you should jack up the frame of the car so as to relieve the pressure on the springs, and then pry them apart by means of a screw driver or cold chisel. Graphite grease may then be inserted with a knife. Oil should be injected into the parts not reached by the grease. There is a tool on the market which may be used to spread the leaves of the springs without jacking up the frame. It serves its purpose very well.

Quick Method.

A still quicker method is to use kerosene to carry oil in between the leaves. Pour kerosene on the top leaf, guiding it down the sides with the fingers. It runs in between the leaves, cutting the rust which would repel the lubricant. Now pour oil on the sides of the springs the same way, guiding it down with the fingers.

The kerosene thins it and it is drawn in between the leaves of the springs as they move. To hasten this shake the car, either by standing on the running board or on the spring hangers at the ends. This is a good method of lubrication, but it will need to be repeated more frequently than the others.

Some repairers use a mixture of hot paraffine and graphite for lubricating the spring leaves.



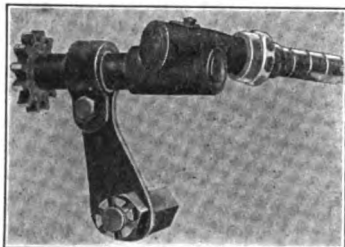
A. Three-Quarter Elliptic Rear Spring; B. Full Elliptic Rear Spring; C. Semi-Elliptic Three-Quarter Platform Rear Spring.

ACCESSORIES DEPARTMENT

Standard Speedometer No. 505 for All Models of Ford Cars is a new instrument of the flush dash type that is fitted into the special cowl board supplied by the manufacturer. It is set in a strong steel



case with a nickel flange for fastening it to the cowl board. The odometer is of the planetary type, having a centrifugal governor. The speedometer, it is claimed, is not affected by atmospheric changes or adjoining electrical apparatus. It has a 10,000-mile season register that repeats automatically, 100-mile trip that can be set to zero in a few seconds time and a silver etched dial with large black numerals that are easily read.



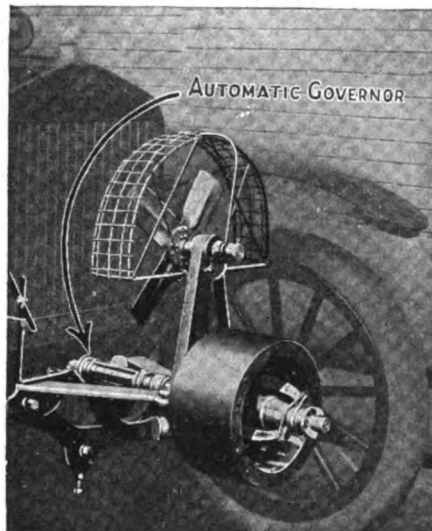
The Standard speedometer is guaranteed, all parts except fiber pinions, against defective material for one year from date of shipment, provided that they are not taken apart or tampered with. Transportation must be paid when returning parts to the factory for repairs.

Manufactured by the Standard Thermometer Co., 65 Shirley Street, Boston. Price, F-505, which comprises the special sedan model No. 205 with angle stem and all fittings for 1919 Fords with starter equipment, \$16.

McGill Autopower Attachment for Ford Cars is a power attachment for driving farm machinery of various kinds that requires power within the range of the Ford engine.

A three-cornered plate is attached to the frame, below and parallel with the ra-

diator, which becomes a permanent part of the car. The attachment is bolted to this plate and consists of a suitable length of shaft that connects with the crankshaft of the engine, the opposite end carrying a friction clutch and pulley supported on a suitable bracket fastened to the permanent plate. The engine is cranked in the usual manner at the end of the length of shaft. After the engine is started the friction clutch allows the engine to pick up its load easily. A fan is mounted above the pulley, protected by a wire screen that supplies air to the cooling system of the engine. This fan is mounted on a standard that is fastened to the front end of the bracket.



The device is equipped with a governor that operates on the throttle of the engine, allowing the engine to supply power according to the work being done.

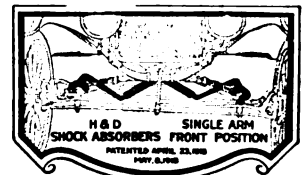
Manufactured by the Knight Metal Products Co., Detroit, Mich. Prices and literature on application.

H & D Ford Shock Absorbers for Passenger Cars or Trucks are manufactured either in twin or single arm and are attached to the spring perch of the axle and



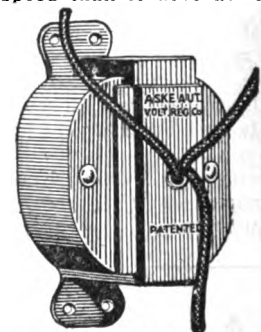
the end of the spring. A coiled spring connects the end of the arm to the body beneath the radiator in the single arm construction. In the twin arm construction two coiled springs are employed, both fastened to the frame member beneath the radiator.

The manufacturer claims that installing a set of H & D shock absorbers on a Ford car will greatly improve its riding qualities and that the car will be free from rattles and squeaks. Easily installed by



any one handy with tools in a few hours. Manufactured by the H & D Co., Inc., Goodland, Ind. Prices on application.

The Aske Automatic Voltage Regulator for Ford Cars is a regulating device that is placed inside the dash of the Ford and automatically regulates the current of the Ford magneto as it is used by the lights. Advantage is taken of the fact that the Ford magneto develops a higher voltage at high speed than it does at low speed,



thus making the headlights burn dim when running slow and very bright when running at speed. The Aske Automatic Voltage Regulator, it is claimed, overcomes this difficulty and is backed up by statements of many users and by experiments carried out by the manufacturer.

The regulator is attached between the magneto and the lights much in the same manner as the regular switch and by means of a switch control, located on a dash board fitted to the cowl, may be dimmed or brightened at the will of the operator. Three pull switches are provided, one for starting on a set of dry cells,



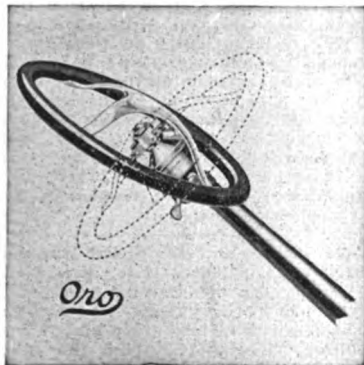
a second for bright lights and the third for dim lights. Use is made of the dry cells for electric lighting the tail light when the car is standing with the engine not running. The regulator and dash board may be attached in a few moments and once installed becomes a part of the car.

Manufactured by the Aske Moore Corporation, Duluth, Minn. Price, regulator, \$5. Instrument board complete, \$15 including regulator.

(When Writing to Advertisers, Please Mention the Automobile Journal.)

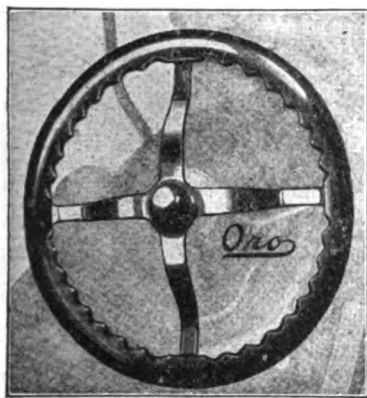
The "Oro" Steering Wheel for Ford and Chevrolet Cars, No. 324, has a spider fitting the shaft of the steering column as in the Ford wheel. It is a highly finished, corrugated wheel that may be tilted forward to the plane of the steering column for the convenience of the operator.

The wheel is 17 inches in diameter, instead of 15 inches, as used on the Ford, increasing the steering leverage and allowing the operator more comfort in driv-



ing and steering. When the driver is leaving the car the wheel is tilted forward, giving more room. Spider is made of malleable iron, finished in black enamel.

No. 326 wheel is similar to No. 324, but does not have the tilting feature. The spider is of the same material and the finish is black enamel. No. 325 has the tilting spider to which only the ordinary



Ford wheel may be attached, giving the tilting effect to the Ford wheel.

Manufactured by the Auto Compressor Co., Wilmington, Del. Prices, No. 324 wheel, complete for Fords, \$6; No. 325, tilting spider only, for Fords, \$3.63; No. 326, non-tilting, corrugated wheel, complete for Fords, \$4.63; No. 402, non-tilting, corrugated wheel for Chevrolet cars, \$4.63; No. 403, non-tilting spider only, for Chevrolet cars, \$2.25.

Emo Transformers consist of a small condenser like attachment that is placed at the terminal of the spark plug where the wire terminal usually attaches, this wire terminal being attached to the terminal of the transformer instead. Current in this manner is led into the transformer where, by means of a condenser like arrangement, the electricity is made to cross a space where there is no conductor, forming a vacuum in its passage.

This jumping of the gap has a tendency



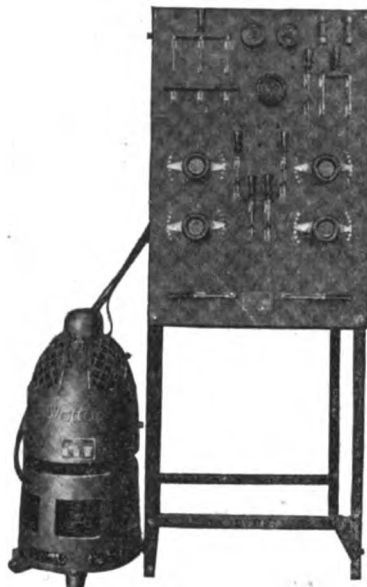
to raise the potential of the current to a somewhat higher voltage, so that the current upon reaching the tip of the plug at the spark gap at the points gives off a heavier and more intense spark. This is particularly desirable where the current is of a weak nature.

The manufacturer claims that the spark

delivered is an intense blue white flash that keeps the plug points free from carbon, soot and oil, prevents bucking and loping of the engine, especially at low speeds, and that after a complete set has been installed the gasoline mixture may be made much leaner by shutting down the gasoline feed at the needle valve.

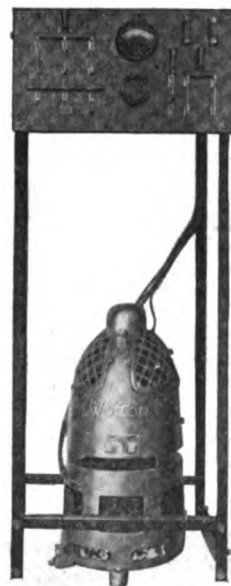
Manufactured by the Emo Laboratories, 2255 N. Illinois Street, Indianapolis, Ind. Price \$1. Special dealers' proposition.

Wotton Vertical Motor Generator Type KS-12-20 is of the single charging circuit type, having control switches for the incoming and outgoing current, rheostat and ammeter for the charging current. One charging circuit is shown, but others may be added as business increase warrants. As many different charging rates as are



desired can be obtained by grouping the batteries on the bench.

Each individual charging rate, if more than one is desired, requires an extra wall rheostat. All types of the Wotton motor generator charging sets are built on the vertical type except the smallest type HS-12-8, which has a capacity of 12 lead cells. This type has been developed for

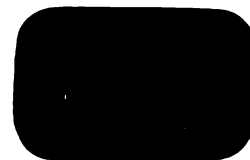


the beginner in the charging business and is not especially adapted to larger installations. Wotton motor generators convert alternating current at line voltage into direct current at battery voltage. Thirty-two, 55 and 110 volts are the standard

voltages for charging batteries. The lowest voltage being ample for the largest battery and the regulation is such as to charge the smallest battery without useless waste of current, the manufacturer claims.

Manufactured by the Electric Products Co., Cleveland, O. Prices and literature on application.

Chaufeur's Hand Soap is used principally for removing grease from the hands of repairers or operators of automobiles. The maker states that it is made from the purest and best of materials, is non-injurious to the skin and leaves the hands



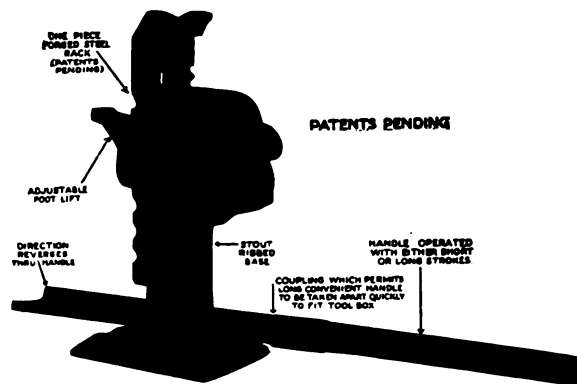
smooth and pliable after use. It is claimed that it will remove all grease and grime. The soap is packed in individual cartons, 100 to the case.

Manufactured by the Decatur Union Chemical Co., Decatur, Ill. Prices on application.

The New Duff Universal Automobile Jack is manufactured in a 1½ ton size only, which is ample for all passenger cars. The jack is operated by as long or as short a stroke as desired and with the operating handle inclined at any angle, a feature desirable in the case of cars having gasoline tank, tires or other obstructions in the rear.

The Duff jack may be either raised or lowered, without reaching under the car, by simply turning the handle half way round. To raise the operating handle is inserted in the socket with the side of the operating handle marked "raise" in the up position. To lower, the operating handle is withdrawn until it disengages the operating mechanism, but still remains in the socket, and is then turned half way round with side marked "lower" up. A spring maintains the socket in a raised or horizontal position so that the operator may insert the handle without bending down to adjust the socket.

By means of an adjustable foot lift this jack may be instantly made to fit under the lower axle of any car. The range of adjustment varies from four to 18 inches and is wide enough to handle any car in any position on or off the road, the manufacturer states.



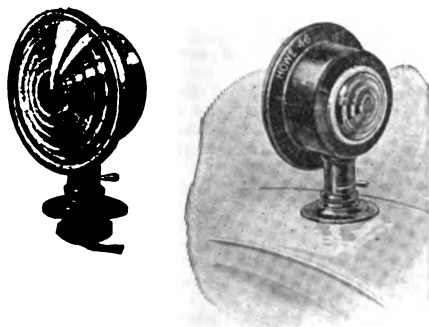
The operating handle is twice as long as the ordinary jack handle, making it easy to operate on account of the greater leverage. The long handle easily clears all obstructions at both front and rear of the car. When not in use the long handle uncouples for half its length, easily fitting into the smallest tool box.

Manufactured by the Duff Manufacturing Co., Pittsburgh, Pa. Sold through jobbing houses. Literature and prices on application.

(When Writing to Advertisers, Please Mention the Automobile Journal.)

The **Howe No. 46 Parking Light** consists of a single lamp, placed on the rear left fender and lighted direct from the storage battery of the car. When the car is parked at night the owner may turn out his head lights and tail light and turning on the switch of the Howe Parking Light, have a light that will show white in front and red in the rear.

It may also be applied to buggies or wagons and lighted from a set of dry cells. The laws of some states make it compulsory for owners of cars to show a



red light in the rear and a white light in front when cars are left standing on public streets or in a public parking space at night.

The outfit includes a switch in the support of the lamp, three feet of water proof wire and a six-eight volt, two candlepower bulb. The face of the lamp is 3 3/4 inches in diameter. The lamp is made of steel and finished in black enamel. The entire weight is one pound. Packed in individual cartons, 50 to the shipping case.

Manufactured by the **Howe Lamp and Manufacturing Co.**, 115-123 E. Ontario Street, Chicago. Price, \$2.50.

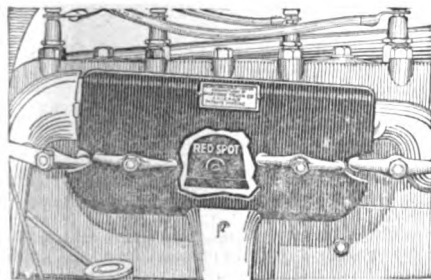
"**Tinol**" Tinning Stick" is a new form of solder and flux combined. When the stick begins to melt it deposits a film



of tin which enables the solder to flow freely. It may also be used for all kinds of tinning work without the use of solder. It is non-corrosive and will answer the purpose of radiator repairers and others in the automotive industry using solder and flux.

Manufactured by **Hess & Son**, 2910 N. 16th Street, Philadelphia. Prices on application.

The **Red Spot** or **Hot Spot** for Ford Cars and Trucks consists of a patented device that is attached between the intake and exhaust manifold of the Ford engine. The maker states that the gasoline today is of a poor grade and to get the utmost power out of it the gasoline must be warmed before entering the cylinders. This duty, it is claimed, the "Hot Spot" performs. After



the "Hot Spot" is positioned, it is covered by a metal cover fitting over the exhaust manifold and inlet manifold. The heat of the exhaust manifold is thus retained and helps still further to warm the entering gas.

The manufacturer claims that its use will make a Ford act similar to a six, in traffic, or on the hills, delivering from 35 to 80 miles more from every tank full of gasoline used. It is claimed that the "Hot Spot" during cold weather will keep the intake manifold warm, insuring easy starting of the engine. It may be attached by anyone in a few moments simply by loosening two nuts and fitting the "Hot Spot" in place. It is guaranteed on a money back basis.

Manufactured by the **Axleford Truck Co.**, 7311 Crandon Avenue, Chicago. Price, \$5.

Clover Grinding and Lapping Compounds are put up in four-ounce and one-pound cans, with two grades, grade A being used to polish the surfaces and insure a perfect contact and grade C to seat the valve.



The manufacturer claims that Clover grinding compounds contain the best abrasive and grease binder that money can buy and that emery is not used for the abrasive material.

The four-ounce can is a convenient size for the motorist or garage man who wishes to give Clover grinding compounds a trial, while the one-pound can is more convenient and economical for the service

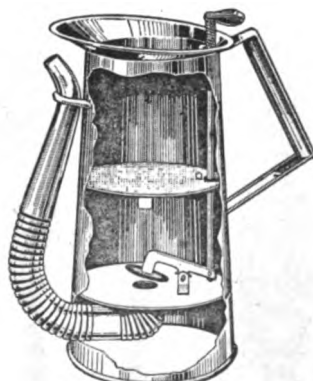


station that has decided to use this brand in valve grinding and piston lapping work.

Seven grades are manufactured: 1-A (very fine), A (fine), B (medium fine), C (medium coarse), D (coarse), E (very coarse) and No. 50 (extra coarse).

Manufactured by the **Clover Manufacturing Co.**, Norwalk, Conn. Prices and literature on application. Special terms to manufacturers.

The **All-in-One Liquid Measure** is a container having a flexible spout and a valve connected to a suitable trip arrangement at the handle for the use of the operator



in putting oil into car engines. It is made throughout of the best of material and has either a copper or tinned finish as the purchaser wishes.

The flexible spout is lifted up out of

the way after using and is held in this position by a small hook on the front of the measure at the top. It is claimed that this device is very handy for the garage or service station, as much of the trouble of supplying oil to autoists is eliminated.

Manufactured by the **Dayton Iron and Steel Co.**, 119 East Third St., Dayton, O. Price, one-half gallon, coppered, \$3.50; one-half gallon, tinned, \$3.25.

Ustus Limousette for Ford Cars is an attachment for converting the regular top of the Ford touring and roadster into a closed top for winter use. It consists of the necessary sections equipped with slides for attaching to the windshield and bows and curtains of the roller type, fastened at the top as in an ordinary window curtain and made of heavy rubber fabric, with DuPont Pyralin windows inserted in the side.

The curtains may be rolled up out of the way for summer driving and drawn down for winter driving, the sides of the



curtains fitting the slides of the bow and windshield sections so that the curtain is prevented from working loose or blowing open.

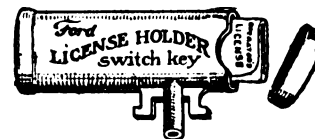
The curtains and sections are easily installed by one handy with tools in two hours without mutilating or altering the present top. After once installed the fixtures become a permanent part of the top, protecting the operator from the storms



of the winter months. A clear range of vision is provided by the use of Pyralin windows in the curtains, giving the operator an unrestricted view on all sides. It is claimed to be wind and rain proof at all points, and improves the general appearance of the car.

Manufactured by the **Dafoc-Eustice Co.**, Inc., West Jefferson Ave., Detroit, Mich. Price, touring car, \$46; roadster, \$30; f. o. b. Detroit. Duty added for Canadian prices.

License Holder and Key for the Ford Car Switch is a metal container for the driver's license and a key for the Ford switch, combined in one article. The container



is made of metal, finished in polished nickel, having a pressed on cap. The container is of ample size for the license when folded and makes a neat, convenient carrier. It is small enough to be carried in the vest pocket when not in use as a switch key and when used as the switch key is not too large to be cumbersome. Put up on neat display boards for the jobbing trade.

Manufactured by the **Metal Specialties Co.**, Attleboro, Mass. Price, 50 cents each.

(When Writing to Advertisers, Please Mention the Automobile Journal.)

Piston Aligning and Bearing Fitting Gauge is a device made for the garage and service station repairer and consists of a bench stand to which the various attachments of the device are fitted. The cut shown gives a clear idea of the device, which is explained as follows: 1, foot of aligning stand; 2, body with $1\frac{1}{2}$ inch hole for arbors; 3, set screw to hold arbors; 4, front surface perfectly square with axis of arbor; 5, surface used for testing if connecting rod is twisted and is perfectly parallel with axis of shaft; 6, connecting rod with bearing; 7, connecting rod stem; 8, piston; 10, arbors are made standard crankshaft size.

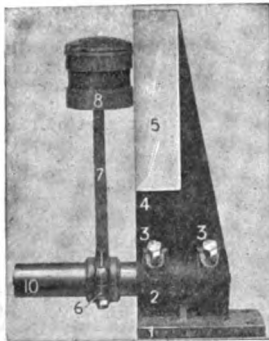
A piston aligning and bearing fitting tool is used as follows: Attach aligning tool stand near the vise with bolts or special screw clamp.

Attach and fasten with set screws arbor, corresponding with size of connecting rod to be fitted.

Fit your bearings into the upper and lower parts of connecting rod, if necessary use a smaller arbor to press them in their place. File sides of bearing so there is enough side play on crankshaft.

Rub some blueing on arbor and start the preliminary fitting of upper and lower halves of bearing; the arbors are ground .002 under size as to allow wear on crankshaft.

When blueing shows about even all over the bearing, install the desired amount of shims so that the connecting rod can be turned with a snug fit. Turn it a few times and then pull the connecting rod off and scrape bearings without disassembling



same.

A bearing can be scraped and fitted to the shaft very quickly as the connecting rod does not have to be taken apart for each fitting; simply slide it over the shaft and tighten bolts. You will find there is very little fitting to be done on the crankshaft if your bearing shows a good surface fitted to the arbor.

When finished fitting to the arbor install the connecting rod with the piston on crankshaft into the cylinder. Inspect if the upper part of connecting rod is in the center of the piston and if the space between the piston and connecting rod is even on both sides. If upper part of connecting rod presses on the side of the piston, it means that you should give the connecting rod a double bend so as to get the part holding the wristpin as near to the center as possible.

The above being corrected, install your connecting rod and piston on the tool stand arbor, press the piston lightly and hold it perfectly vertical against the straight edge of the tool stand with a good light back of the piston. If upper or lower part of piston touches the tool stand give connecting rod a slight bend so as to get the piston perfectly parallel with the straight edge. Always allow the upper part of the piston a few thousandths of an inch as all pistons are slightly smaller where the rings are than the skirt of the piston. To have a double check on the alignment, simply turn the connecting rod around and test the opposite side of the piston.

The above in good order, take the piston off, move your connecting rod towards the stand, push wristpin against the machined back part of the stand and see that the pin rests on both ends against it. If

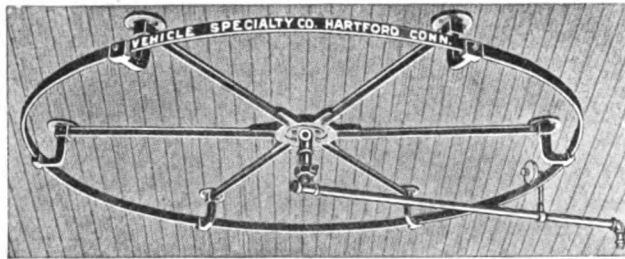
not, twist the connecting rod until the wristpin lies perfectly parallel against the tool stand. It is advisable to check up the piston again as a connecting rod may bend in twisting.

After the foregoing work has been done properly finish fitting the connecting rod bearing to the crankshaft. On older and used cars it is advisable to lap or regrind the crankshaft, because it is practically impossible to fit a bearing correctly to an oval or tapered crankshaft.

Manufactured by John Peyer, 301 West 68th Street, New York City. Price of device with one arbor selected, \$24.50; other fittings may be obtained as extras.

The Rhodes "Deluxe" Overhead Vehicle Washer is designed to meet requirements where a hose arm longer than $4\frac{1}{2}$ feet is required. The hose arm is supported in any position by a circular steel track which takes all of the strain from the washer head. The washer is designed for hard usage and will cover a large amount of floor space.

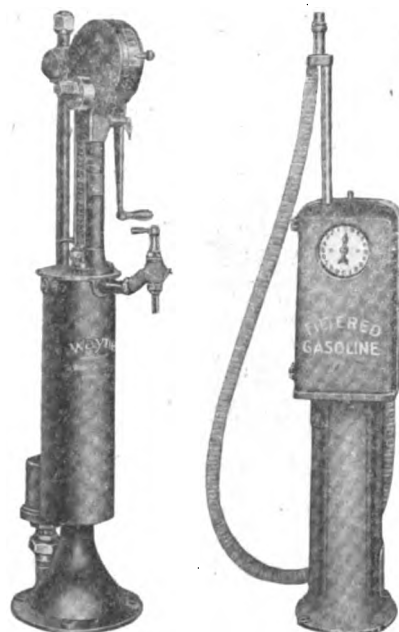
It consists of a large circular ring, supported at six points to the ceiling, and the center is supported by arms joining the ring fastenings and forming a hub to which the water connection to the main is made. It is stated that the connection is non-leakable and its rigid fastening to the ceiling makes this washer a valuable piece of equipment. The washer head is constructed entirely of brass and is furnished both in the plain and the illuminated styles. The regular length of the hose arm is five feet from the center, thus cov-



ering a 10-foot circle. Longer hose arms may be supplied if necessary. The "Deluxe" is guaranteed to be water tight and non-leakable.

Manufactured by the Vehicle Specialty Co., Inc., 51 Oak Street, Hartford, Conn. Price, plain washer, \$40; illuminated, \$60.

Wayne Long Distance Gasoline or Oil Pump No. 22 is designed to lift gasoline, light or heavy bodied oils where the ver-



tical lift is under 14 feet. The pump is designed principally for inside work in garages, service stations, etc., in connection with an underground tank.

The pump is made of cast iron, steel and brass. The valve, valve seats, stuffing box, plunger rod, etc., are made of solid bronze. The measuring cylinder is made of seamless brass tubing, fitted with solid heads and protected by four $\frac{1}{2}$ -inch steel rods and steel jacket. The discharge register automatically tallies the number of gallons pumped up to 10 and then repeats. Avoids mistakes in filling larger vessels and provides a check should the operator be called away before finishing the work.

A hollow ball at the top of the pump provides room for the expansion of liquids in the cylinder due to changes in temperature and is necessary to insure correct measurement.

The Wayne Kerosene and Gasoline Pump No. 207 is a later design than No. 22 and is designed for long distance work. The underground tank is buried in the ground in any convenient location and at any reasonable distance from the pump. The pump and tank are connected by a $1\frac{1}{2}$ -inch pipe line, allowing free and rapid flow of gasoline. It is specially designed for sidewalk installation, but may be used inside if desired. A cabinet or housing of cast iron thoroughly protects the working parts from the elements.

The door, on the street side, in which is set the large 20-gallon discharge register, is stationary. The door on the opposite side may be opened and closed, giving access to the operating parts of the pump. The pump is provided with overhead discharge and hose draining valve. May be set to discharge gallons, half gallons or quarts at a stroke.

The outfit is complete with eight feet of hose, curved bib, computer, discharge register, filter, meter and foot valves. Where tank is included with the order additional equipment is supplied as follows: Gauge stick for tank, fill pipe, assembly complete and suction pipe with union for tank. Other articles manufactured by this company include curb outfits for gasoline, outfits for air and water, first floor kerosene and gasoline outfits, cellar outfits, lubricating oil batteries and portable tanks for oil and gasoline.

Manufactured by the Wayne Oil Tank & Pump Co., Fort Wayne, Ind. Prices and literature on application.

The Dyer Lightweight Piston for the Ford Engine is made from a close grained metal, taking a high finish and with as much care as is given to the piston of the highest priced car and is correct in every measurement, the maker states.

This piston is made of a tough material, absolutely round in shape, perfectly machined by experts in fine machine work,



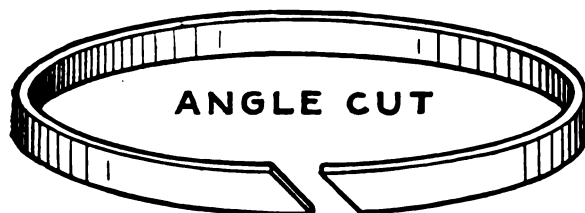
has uniform walls, special oiling features and is accurately fitted with special lap joint rings.

The piston weighs four pounds less than the regular Ford piston and is claimed to greatly increase the efficiency of the Ford engine, decreasing the bearing wear, vibration and the gas and oil consumption. Pistons in stock for all popular make cars, also regular Ford weight pistons.

Manufactured by the G. H. Dyer Co., 133 Brookline Street, Cambridge, Mass. Price according to size of pistons on request.

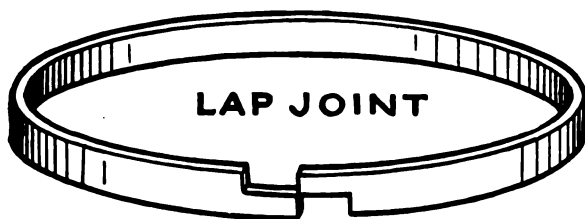
(When Writing to Advertisers, Please Mention the Automobile Journal.)

Pepco Piston Rings and Ford Differential Rings are made from the finest and most expensive ingredients of gray iron in order to insure a close grain and soft metal. Each ring is cast individually in order to



insure uniform and resilient metal construction. The inside scale of the ring is preserved in order to give the ring constant and everlasting spring action under all conditions of heat.

Pepco rings are machined by automatic special machinery by up-to-the-minute methods and processes by skilled mechanics. Every ring is gauged and inspected several times by trained inspectors to de-



tect the least imperfection or inaccuracy.

Pepco rings are handled only through the jobbing trade and may be found at all jobbing houses. Pepco Ford differential rings are made in either bronze or babbitt and are made especially for the Ford trade.

Manufactured by the Pennsylvania Piston Ring Co., 203-205 St. Clair Avenue, N. E., Cleveland, O. Prices and literature on request.

Radiator Neverleak is a liquid preparation that mixes readily with water. It is put into the radiator through the filler spout, the engine is run for 10 minutes and the leaks of the radiator will be sealed with a paint-like substance that will harden when coming in contact with the air, sealing small leaks permanently. Neverleak may be left in the cooling sys-

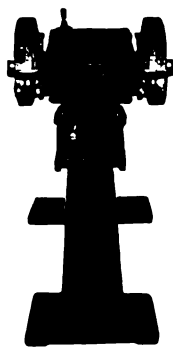


tem as it is not injurious to the metal of the system, and in case of further leaks the compound will fill and stop the leaks. It will not evaporate or lose its strength and may be used in the cooling system indefinitely.

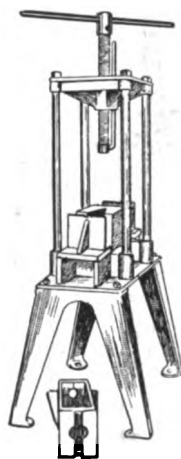
Alcohol may be used successfully with Neverleak in the cooling system without danger. If any anti-freeze article other than alcohol has been used in the radiator the water must be drained off and the radiator thoroughly flushed and filled with clean water before putting in the Radiator Neverleak. This is necessary because of the strong chemicals used in some of the anti-freeze articles on the market.

Manufactured by the Buffalo Specialty Co., Buffalo, N. Y., and Bridgeburg, Ont., Canada. Prices on request.

(When Writing to Advertisers, Please Mention the Automobile Journal.)



The Whitney Arbor Press is the result of many years of continuous and careful study of press problems that are met by the average machine shop, a press that



combines simplicity and durability and is constructed on mechanical principles to perform accurately on all types of work liable to come to the average shop or service station.

These presses are light in weight for their capacity, yet are compact. Both the head and base of the press are substantially webbed supplying additional strength to these parts subject to the greatest strain. The base is provided with ways similar to a lathe, permitting the blocks to slide into various positions, offering a firm foundation for the work. A large recess through the base is provided to allow the passage of shafts and arbors. The screw has a square thread, which retards its wearing to any great extent, and the head is provided with recesses which will allow the use of two bars when exceptionally heavy pressure is required.

A patented feature of this arbor press is a guide rod sliding parallel with the screw and attached to a cap on the pressure end of the ram. This rod prevents a twisting strain on the surface of the work and by relieving these surface strains there is no tendency to change or weaken the assembly of the equipment necessary to support the work.

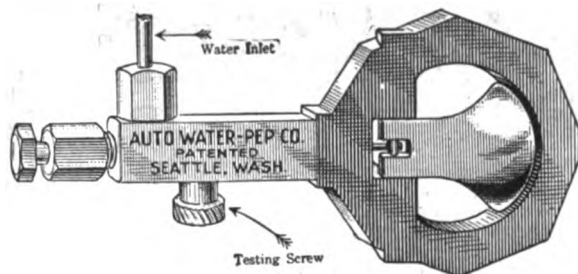
The extra attachments included with each press are two sliding blocks, one sliding V box block, one extension V block and also an axle attachment designed especially for Ford axles. The press is manufactured in two sizes, No. 1 and No. 2, the former having a capacity of 30 tons and the latter of 50 tons.

Manufactured by the R. S. Whitney Manufacturing Co., 74 Nichols Street, Lewiston, Me. Prices on request.

The Automatic Water-Pep consists of an automatic device that is installed between the carburetor and the intake manifold at the point where the two are joined by flanges. It introduces a small amount of water into the intake manifold when the

engine is operating and tends to keep down the accumulation of carbon and supplies a predetermined amount of moisture that has a tendency to make the engine operate as it does in the evening when more or less moisture is present in the atmosphere. The water may be supplied either from a separate tank or from the water return of the cooling system. The usual practice is to connect the water cooling system direct to the device.

A small regulating screw determines the amount of water admitted to the intake manifold, from 40 to 60 drops per minute being recommended. The flow of the water is automatically controlled by a valve in the intake manifold that opens when the engine is operating, supplying the moisture in proportion to the speed of the engine, closing when the engine stops and shutting off the flow of water.

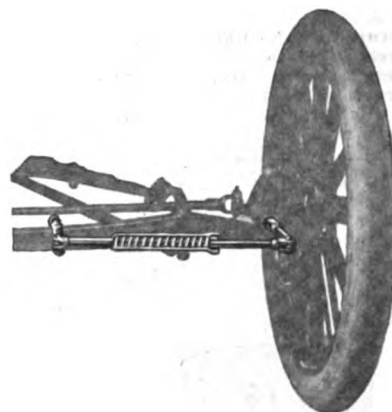


Manufactured by the Auto Water-Pep Co., 2201 Second Avenue, Seattle, Wash. Price, \$12 anywhere in the United States.

Protecto for Ford Cars is a new automatic steering device that is attached to the front axle and extensions of the steering spindle arms. The device is clamped to the axle at one end by means of a hinged joint and consists of a rod later formed into a cylinder in which a spring actuated rod works, the opposite end of the cylinder being fastened to the steering spindle arm extension. The cylinder contains a coiled spring that offers a certain amount of resistance to the pull of the rod, this pull serving to check any

PROTECTO

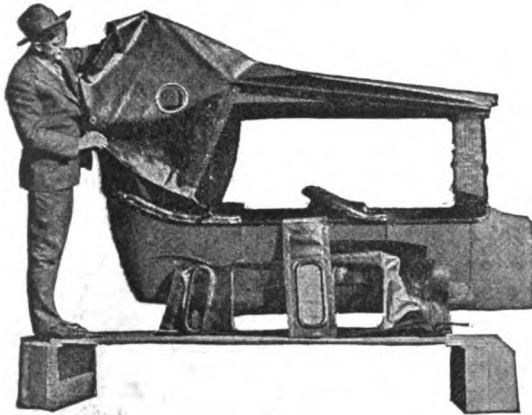
side motion of the wheels. It is stated that this device will automatically control the steering of a Ford car in case anything should happen to the steering gear.



The maker states that it allows the Ford car to be driven much faster over ordinary roads than is possible with the regular steering gear. The device is attached at each end of the axle. Two forming the set.

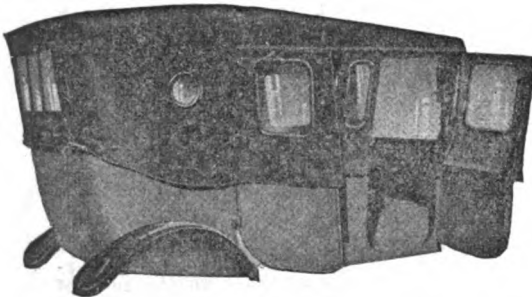
Manufactured by the Robinson Motor Truck Co., 905 Hennepin Avenue, Minneapolis, Minn. Prices on application.

Baker "Over-the-Top" Auto Top is a patented device for converting the regular top of many passenger cars, including the Ford, into a closed car for winter use. It consists of a covering of extra heavy artificial leather that is applied by fitting it over the old top now on the car. It has three lights in the rear curtain and a single round light at each side. Special side sections are supplied for the doors and the section between the doors, each pro-



vided with a large light. Door sections fasten to the top of door by a strap iron and swing open with the door. It is made for the following cars:

Class one, Ford touring and roadsters only, special with all celluloid windows;



regular with all glass windows, except over right front door.

Class two (1917, 1918, 1919 models only), Buick, D, E and H, 34-35-44-45; Chevrolet, Dodge, Dort, Hupmobile, Maxwell, Oakland 32, Overland 75-83-90, touring and country club models.

Class three, Buick E and H 49; Essex, touring only; Hudson, speedster and touring; Nash, touring only; Oldsmobile, four-passenger, sport and touring; Overland 85, four and six-cylinder; Reo, Studebaker, touring only.

Patterns for other models will be ready very soon.

Manufactured by the **Baker & Lockwood Manufacturing Co.**, Seventh and Wyandotte Streets, Kansas City, Mo.; 473 Kent Avenue, Brooklyn, N. Y., and 3021-23 Michigan Avenue, Chicago. Prices and literature on request.

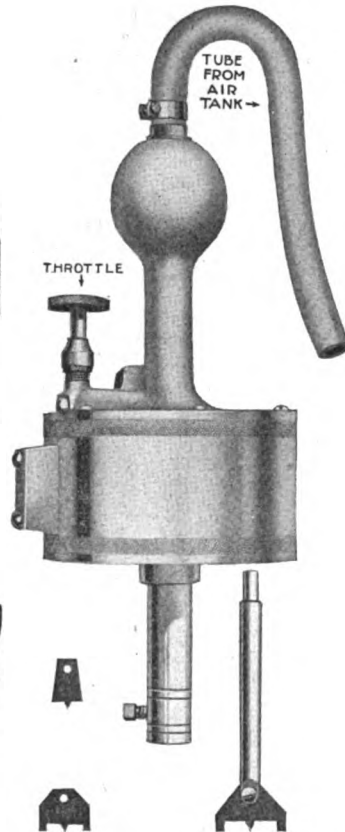
Norwesco Iron Cement is a new product which the manufacturer claims will permanently repair cracks, blemishes and sand holes in iron and steel castings and leaks in radiators, boilers, steam, hot and cold water pipes, threaded joints, etc. It is made in powder form and manufactured under strict laboratory supervision, which



insures a standard quality that will give the desired results.

Norwesco Iron Cement is put up in cans of three sizes, six ounces, one pound and five pounds. When mixed with water and applied according to directions repairs may be made at small expense.

Manufactured by the **Northwestern Chemical Co.**, Marietta, O. Prices on application.



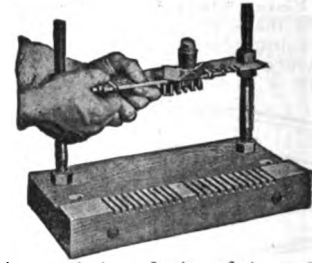
Veltum Pneumatic Valve Grinder is a new tool for the repair shop and service station that differs from the regular run of tools for this class of work in that air is used for the source of power instead of electricity.

In the Veltum Pneumatic Valve Grinder the operator has complete control of the speed of the tool from 50 to 1000 strokes per minute at an air pressure of from 15 to 500 pounds of air taken from any source of supply that one may now have. The maker states that it is possible to do the entire job of grinding, using low speed for preliminary grinding, intermediate grinding at high speed and finishing at low speed.

The manufacturer states that this tool will grind any size valve, fit over any size valve stems into valve guides and is capable of handling delicate work, such as grinding carburetor float valve stems and fuel system valves. All castings are of aluminum, which gives the tool unusual lightness.

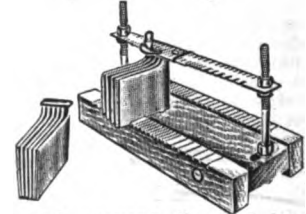
Manufactured by the **Warnock-Worth Co.**, 624 S. Michigan Avenue, Chicago. Price, \$22.50. Sold only through the jobbing trade.

Ambu Plate Burning Racks are to be used when burning-in battery straps to plates or burn-in new plates. The racks have guiding slots cut in the base and in the iron bar, or comb at the top. In this way the plates are held at exactly the right distance apart both at the top and bottom. Bases are made of hard wood. The small rack is large enough to take care of practically all 1/4-inch plates made by Willard, Gould, Philadelphia and U. S. L. It will also accommodate all thin plates such as the Exide 3xC, Willard and Gould. The large rack will take care of many



other types, being designed to accommodate fully 95 per cent. of all the types of plates which are made.

Special iron fittings are furnished, which are placed around the plate lugs on the comb so as to hold the plates firmly in



position and prevent the hot lead from running off. The maker claims that this device enables the operator to burn-in plates in half the time required when using the ordinary rack.

Manufactured by the **American Bureau of Engineering**, 1601-1603 S. Michigan Avenue, Chicago, Ill. Prices, small rack, \$7.50; large rack, \$12.50.

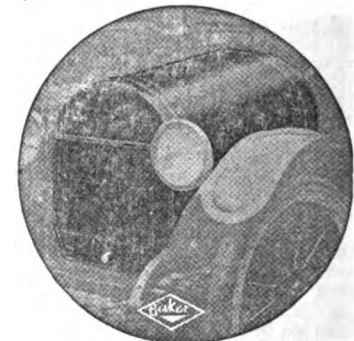
Baker Hood and Radiator Covers for All Cars Except Fords are manufactured from three grades of material, enameled drill, enameled duck and artificial leather, and in three sizes—class number one for small cars, class number two for all medium size cars and class number three for very large cars. A line of radiator covers for commercial cars and trucks is also manufactured, as well as a special line for the Ford car.

The covers are so made that the shutter at the front may be rolled up only half



way or all the way, exposing the top alone to the air and leaving the bottom covered or open all the way as desired. They fit the engine from the dash to the radiator, including the radiator, or may be purchased for the radiator alone.

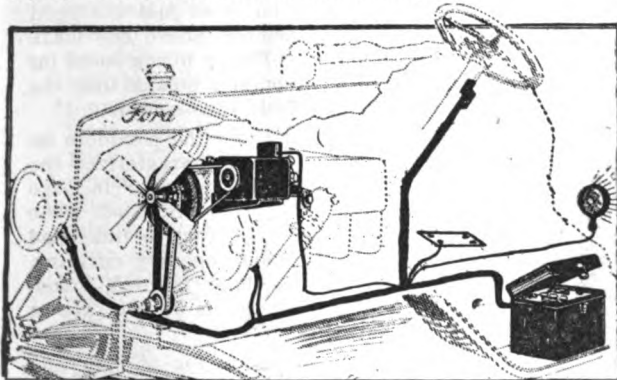
Manufactured by the **Baker & Lockwood Manufacturing Co.**, Kansas City, Mo., 3021-23 Michigan Avenue, Chicago; 473 Kent Avenue, Brooklyn, N. Y. Prices on application.



(When Writing to Advertisers, Please Mention the Automobile Journal.)

Titon Electric Lighting System for Ford Cars consists of a generator, cut-out, battery and battery box, tail light, two head-light bulbs and special attachments. Special Ford attachments consist of generator bracket, complete wiring assembly with switch, pulleys, belts, bolts and full instructions for installing in the car.

The generator is two-pole, shunt wound, with ball bearings, and is provided with a third brush for regulating the output. A simple, reliable cut out relay is mounted on top of the generator, making a single unit of the two. The output of the generator is sufficient to keep the battery charged at all times. The battery is of unusually strong construction and of ample

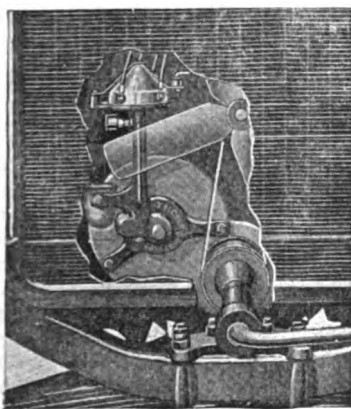


capacity to care for the lights of any car.

The wiring assembly is complete in itself and takes the place of the original wiring for the lights. The switch is mounted on the under side of the steering column next to the wheel and is provided with two push buttons, one of which throws the lights on while the other is used in dimming the lights, and they are within easy reaching distance.

Manufactured by the Titon Engineering Co., Union City, Ind. Price on application.

The Thomas Timer Elevator consists of a suitable bracket or housing and the necessary drive shaft and bevel pinions attached to the end of the camshaft of the Ford engine, and elevates the timer to a vertical position, where it is protected from dust and mud. The Thomas Timer Elevator is installed in a short time and allows the placing of the wires from the coil to the timer in an overhead position.



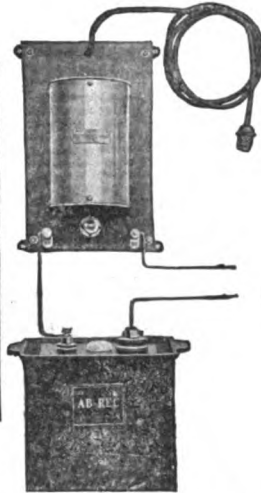
where they will be free from oil. The timer is placed in a more accessible location and may be repaired to better advantage.

Lubrication for the drive shaft is provided by means of a compression grease cup, placed below the timer case. It is claimed that elevating the timer in this manner will eliminate many of the troubles to which the Ford timer is subject. The Timer Elevator will fit any Ford car, truck or tractor and may be installed without removing the radiator.

Manufactured by the Thomas-Andrews Corporation, 624 South Michigan Avenue, Chicago, Ill. Factory, Waukegan, Ill. Price, \$6.50.

The Ab-rec is a device that enables the motorist to charge a 6, 8, 12, 18 or 20-volt storage battery from an alternating current circuit. The Ab-rec will pass a current of about two amperes charging a six-volt battery. When charging a higher voltage battery the current will be somewhat less. The charger is operated by screwing a plug into a lamp socket, connecting two wires to the battery and turning the socket button.

The outfit is automatic in operation, as there are no regulating appliances. An amperemeter is not included, although the



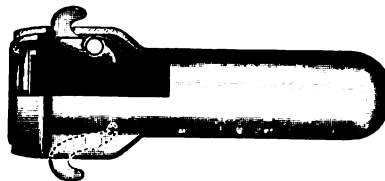
manufacturer recommends its use and sells it as an extra. The device, it is claimed, cannot be burned out regardless of whether one is charging a 6, 8, 12, 18 or 20-volt battery. After long service, usually a year for a private owner, two small electrodes will be consumed and a change of fluid will be necessary. The fluid is made by dissolving in pure water a powder, obtained from the manufacturer.

The device has been thoroughly tested by the manufacturer and, in fact, is an improvement of an older one manufactured by the same company.

Manufactured by American Battery Co., 1132-1134 Fulton St., Chicago, Ill. Price, for alternating current circuits of from 50 to 125 volts pressure, \$24; ammeter, extra, \$8. Shipping weight, 45 pounds.

Schrader Universal Quick Acting Dust Cap. The firm of A. Schrader's Son, Inc., is bringing out a new patented quick acting dust cap which, besides being easy and rapid in attachment and detachment, possesses the additional quality of being highly ornamental. The new dust cap is made of brass drawn into a shell and has two lateral teeth or prongs made of tempered steel which fasten into the thread of the valve stem.

There is no screwing or turning of the cap to engage the thread of the valve stem. One simply slips the cap over the valve stem as he would slip a thimble over



Schrader Universal Quick Acting Dust Cap No. 3199, Patented Nov. 23, 1915, April 29, 1919.

his thumb. The entire operation of putting on or taking off the new dust cap occupies less than two seconds.

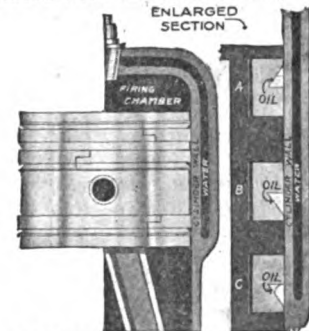
Because of its clean lines and high nickel finish it will make a special appeal to motorists who are fastidious as to the appearance of their cars.

Manufactured by A. Schrader's Son, Inc., 800 Atlantic Avenue, Brooklyn, N. Y. Retail price, 50 cents; \$2.50 for a set of five.

The No-Leak-O-Oil Sealing Piston Ring is a patented piston ring that is guaranteed by the manufacturer to prevent the passage of oil from the base of the engine into the combustion chamber and also prevent the passage of kerosene, or coal oil as it is sometimes called, from passing from the combustion chamber, where it is present in the fuel gas, to the base of the engine and mixing with the oil of the reservoir.

The rings are similar in construction and form to the regular cast rings, differing from them by having a groove cut at right angles to their face, and passing completely around the ring. One edge of the groove has a square edge, while the other is beveled at a 45-degree angle.

In placing a set on the piston the upper ring is placed with the bevel at the top and the square edge down, to prevent the passage of the kerosene. The other rings are placed with the bevel and square edges



down, preventing the passage of the oil from the base. In operation oil from the base works up on the cylinder walls, fills the two bottom grooves, acting as a cushion or packing between the piston and the cylinder wall, while the upper groove, filled with oil and kerosene, acts in the same capacity. By this method, it is claimed, carbon in the combustion chamber is reduced to a minimum, and the wastage of oil from the base is prevented. If a cylinder is scored or badly scored, it is further claimed that no direct benefit will be obtained.

The accompanying cut well illustrates the placing of the rings on the piston.

Manufactured by No-Leak-O-Oil Piston Ring Co., 824 W. North Avenue, Baltimore, Md. Prices and literature on application.

Ford Car Enamel is an enamel paint that the manufacturer claims can be applied to the car one day and will dry so that the car may be used next day. The paint and varnish are combined so that only one coat is necessary, requiring but very little time and effort to apply.

The ingredients used in its manufacture have been proven by the manufacturer to be highly satisfactory for applying to



metal surfaces, for withstanding the expansion and contraction of the metal, and insures a beautiful lustrous and lasting finish.

Other articles manufactured by the company include Waterproof Mohair Top Dressing, Leather R-Nu, Nu-Auto Finish, Diamond Carbon Remover, Engine Enamel, Lining Dye, Aluminum Paint, Body-Nu, Brass-Nu, Rubber-Nu, Nu-Back Shellac and Lamp and Fender Enamel.

Manufactured by the Nu-Back Manufacturing Co., St. Louis, Mo. Prices, Ford car enamel, quart, \$1.50; pint, 90c.

(When Writing to Advertisers, Please Mention the Automobile Journal.)

HAYNES PLANS EQUAL DIVISION OF OPEN AND CLOSED CARS.

The Haynes Automobile Co., Kokomo, Ind., announces that 50 per cent. of its automobiles next year will be closed styles, according to plans now being formulated. The other 50 per cent. will consist of open models. This equal division in the production of the open and closed styles by a motor car institution of the size of the Haynes company is believed to be without precedent in the automobile world.

Not only is it a departure from the older division of production, but it also is tremendously significant in that it marks the beginning of a new era in the automobile history of the country—an era in which the closed car, long in the minority, will hold sway as the favorite of the automobile buying public.

Heretofore, open cars were manufactured in greater quantities than closed styles. Gradually, however, the closed cars have been growing in favor until now it is predicted that in time there will be more closed cars seen in the roads than open styles.

"One needs but to turn to the evolution of the street car to see an analogous situation," states A. G. Seiberling, vice president and general manager of the Haynes company. "Practically all of the earlier street cars were open cars. Then came a period in which we had 'summer' cars and 'winter' cars. Today practically all street cars are closed body styles with a window arrangement whereby they may be transformed into open, airy vehicles during the summer months. The 'open' street car is a thing of the past.

"A similar evolution seems to be taking place with the automobile. We find today more closed cars in use than ever before and little by little the production of the closed styles is creeping up on that of the open ones.

"The reason for this is that the automobile purchasing public is realizing more and more the all-season value and usefulness of the closed car. In cold and inclement weather it can be used as readily and as conveniently as under ideal motoring conditions. In warmer weather, by lowering the glasses, the closed car has the same advantages as the open car. The people are becoming educated to these facts and are demanding closed cars. For that reason we are now planning to divide our production equally next year between the open and closed car styles."

CANADA'S AUTO EXPORTS.

Canada's motor car exports for the year ended March 31, 1919, included 1472, valued at \$713,920, to the United Kingdom; 52, valued at \$39,295, to the United States; 4080, valued at \$1,812,690, to Australia, and 1588, valued at \$806,775, to New Zealand. There were also 2567 freight automobiles exported, valued at \$1,313,770. Automobile parts exported were valued at \$1,552,296.

B. & W. Manufacturing Co. Will Increase Production

The B. & W. Manufacturing Co., Chicago, manufacturer of radiators for the automotive industry, has made great strides since it was incorporated in January. The first radiators were shipped in June and since then orders amounting to over \$750,000 have been written.

The factory in Chicago is now turning out an average of more than 300 ra-



S. D. Briggs, General Manager of B. & W. Manufacturing Co.

diators per day. General Manager S. D. Briggs states that every indication is for increased production in 1920. All manufacturers now being served by the company have indicated their intention of increasing their orders after Jan. 1.

The company is planning to increase its production to 600 radiators per day beginning Jan. 1, and, from all indications, will on that date have sufficient orders booked to carry it throughout the year.

GASTINE'S NEW DISTRIBUTORS.

The following new offices and distributors for Gastine sales are announced by the Gastine Co., Bridgeton, N. J.: Gastine sales agent, 253 Central avenue, Albany, N. Y., distributor for northern New York; New England Gastine Sales Co., 210 Harvard avenue, Allston, Mass., distributor for the New England states; S. F. Holden, 959 Madison avenue, Paterson, N. J., distributor for northern New Jersey, and the Southern Gastine Sales Co., 623 Forsythe building, Atlanta, Ga.

NEED GARAGES.

Wilmington, Del., is facing the problem of insufficient automobile housing. It is estimated that space for 1000 more cars is needed, the lack of which is affecting the trade. Wilmington car dealers are urging the erection of more garages.

CLEVELAND SIX ROADSTER NOW WELL INTO PRODUCTION.

The Cleveland light six roadster is now well into production and these cars are going forward rapidly from the plant of the Cleveland Automobile Co., Cleveland, O., to dealers throughout the country. Like the touring model, this car has long, low, classy lines, which give to the roadster a decidedly artistic appearance.

The Cleveland light six roadster seats three persons comfortably. Its invitingly wide seat is placed at just the right angle and the cushions afford the maximum of comfort. Plenty of leg room for even the tallest person means that the average person finds rare comfort.

This model has the same complete instrument board which characterizes the touring car. The steering wheel is large and the control is easily reached. The top has exceedingly attractive lines and is equipped with door opening curtains. Upholstery is in long grained, hand-buffed leather and details of trim are in perfect harmony.

Ample storage space for parcels and luggage is provided in the Cleveland light six roadster. Back of the seat is a large compartment which opens from the top. A partition separates this from a large space under the rear deck. This partition is hinged and easily let down, enabling the motorist to store baggage under the deck. There is no door on the outside of this deck and hence dirt and moisture cannot enter, nor can a rattle develop from a loose deck door.

Tools are carried beneath the cushions. The horn button is on the steering wheel. The spring suspension of the Cleveland six brings a new degree of riding comfort to the light car field.

Ample power, high quality finish, infinite attention to details, with sturdiness and beauty of lines, are combined in the Cleveland six. The motor is original with the Cleveland and is free from vibration at all driving speeds.

"SEPARATORLESS BATTERY."

The Electrolyte Storage Battery Co., Philadelphia, has begun quantity production of a "Separatorless Electric Storage Battery." This battery contains no wood, composition or rubber separators between its plates, and there is free access of the electric current in discharge between the plates, permitted by the use of narrow chunks of hard rubber, inlaid in the plates in a compartment not coming in contact with the active material, which keep the electrodes apart, thus obviating the use of wooden separators.

6,250,000 TIRES BEING MADE BY GOODYEAR IN 1919.

At the beginning of the 1918-1919 fiscal year the factory of the Goodyear Tire & Rubber Co., Akron, O., was asked to produce 6,000,000 automobile tires during the year. Goodyear's actual production for the year will run about 6,250,000 tires, and even this great number is not enough to fill the present demand.

AUTO MAKERS ASK HEAVY DELIVERIES OF SHEETS.

The steel strike has failed to have the serious effect on the automobile industry that was at first feared. Automobile builders, however, are now looking for heavy deliveries of sheets, and this despite the fact that they are shorter of several other descriptions of materials than they are of sheets. Their productive needs are so great that they are simply applying pressure all along the line, calling for heavy deliveries of all their raw materials.

Some large tonnages are offered mills for delivery over the first half of 1920, but the mills are looking at the offered tonnages in rather a reserved manner. It is difficult for the observer to keep pace with the rapidly growing sheet needs of the automobile industry. For illustration, there are few outside the industry who would suppose that there are four automobile concerns (counting the General Motors as one) that consume sheets each at the rate of more than 100,000 tons a year, yet such is the case.

Sheet mill operations now average more than 75 per cent., or, in other words, the industry shows, in point of tonnage, little effect from the strike, as before it began the industry was operating at only between 80 and 85 per cent. Talk of advanced price in sheets is still heard among the independents, but such a policy does not find any favor with the leading interest.

SAYS GASOLINE SHOULD BE STORED UNDER GROUND.

The prime reason for advocating the storage of gasoline under ground is from the standpoint of safety, states S. F. Bowser & Co., Inc., Fort Wayne, Ind. Another good reason which is important to the motorist is that gasoline stored beneath the ground is maintained in its full power, free from evaporation or deterioration.

When gasoline comes from the refinery it contains what is called a chain of boiling point fractions, starting at, say, 100 degrees and continuing up to perhaps 400 degrees. It also contains the correct proportion of low boiling point fractions to insure easy starting in any temperature, the correct proportion of intermediate boiling point fractions to insure smooth acceleration and the correct proportion of high boiling point fractions to give the maximum power, speed and miles to the gallon.

It can be readily understood by even the novice motorist that gasoline above ground, even though it may be in a glass bottle in five-gallon lots, is subject to the sun's rays or change in temperature, which is bound to affect the consistency of the gasoline.

It would be well for motorists to take the trouble of seeing that their gas supply is secured direct from under ground tanks, delivered to the car direct by suction rather than by air pressure, as air pressure is bound to force air bubbles through the gas, which would take with it the vapor from the liquid, which is the very life of it.

National Campaign to Repopularize the Horse

THE incorporation of an association in New York to wage a national campaign to repopularize the horse is not worrying New York automobile distributors.

"Despite Black Beauty and Paul Revere's steed," said one dealer, "the horse is not a sentimental issue, and cannot be made one. The survival of the horse, precisely like the survival of any system of device of commerce, must depend entirely upon economic use and justification. Otherwise we shall not progress.

"Statistics presumably authoritative show that the number of horses in New York City alone has decreased in the last three years from 108,000 to 76,000. Remember, too, that this drop of almost one-third was recorded during a period in which the vast majority of our motor trucks were being delivered to our armies or to those of our allies.

"It is only now that the real era of the truck and delivery auto is beginning and the growing evidence of their utility and the increasing attention to road building will soon force the horse completely out of metropolitan business.

"No one seeks to belittle the work of Paul Revere, but think of how many more men he could have rallied—and how much sooner—had he been equipped with an automobile. Sheridan wouldn't have worked himself into a frenzy or such a state of perspiration, as he rode mile after mile to reach his men.

"As for King Richard, who offered a kingdom for a horse—well, Richard never knew the joy of riding in even a flivver."

BRITISH STRIKE HITS TRADE.

The strike of iron moulders in England has a very disturbing effect upon the motor trade in general. The Singer Motor Works has been closed for two days a week. There is a stringency in the steel market and the home output has been cut down to 65 per cent. of normal. Many big firms will have to close unless castings become available through importations from America or Lorraine. No home deliveries of cars are being promised before the middle of 1920 and prices are being left subject to the state of the market at time of delivery.

RAYFIELD ENGINEERING BUYS LAND FOR NEW PLANT.

The Rayfield Engineering Corporation, with offices at 309 Lafayette street, New York, manufacturer of Hilton high pressure tire pumps and other metal specialties, has purchased 15 acres of land at Farmingdale, L. I., and work on the first two units of its plant will be started immediately. The company recently closed contracts for its products amounting to over \$2,500,000.

H. & D. HAND BOOK.

The H. & D. Co., Inc., Goodland, Ind., has issued a hand book in pocket size, beautifully printed in two colors, bound in Levant flexible case binding, with cover printed in gold. Some copies have paper binding. It contains 32 pages of valuable and interesting information on how to sell H. & D. shock absorbers. The purpose of the book is to assist the jobber and dealer, together with their salesmen, to talk intelligently on the good selling points of H. & D. shock absorbers, also putting before them in concrete form why and how H. & D. shock absorbers absorb the road shock and eliminate rebound, side sway and hammering.

The flexible case bound books are being mailed to jobbers and their salesmen with their individual names printed in gold on the cover. The paper bound books are intended for dealers and their



H. & D. Company's Pocket Hand Book.

salesmen. These will be mailed without imprinting of any individual names.

CURTISS LEAVES SPLITDORF TO GO WITH NEW COMPANY.

C. W. Curtiss has resigned as director and general manager of the Splitdorf Electrical Co. to take charge of the affairs of a large automobile accessory company whose headquarters will be located in Newark, N. J. The company with which he is to become identified will proceed with the erection of a large plant to take care of the expansion of a business of tremendous proportions and of far-reaching import to the automotive industry, it is announced.

The Nashville Automobile Trade Association, Nashville, Tenn., will have a show the week of Feb. 9-14. Efforts are being made to have the biggest show ever staged in the South.

The stockholders of the Goodyear Tire & Rubber Co., Akron, O., at a meeting held Nov. 17, voted to increase the capital stock of the company from \$100,000,000 to \$200,000,000.

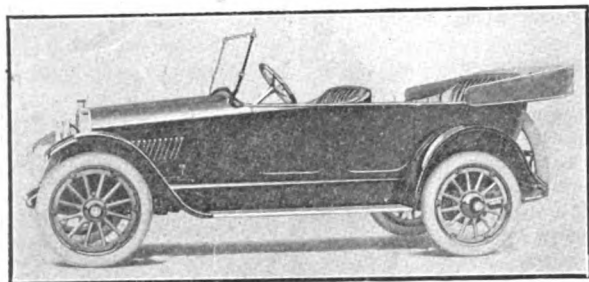
NEW OLDSMOBILE IS DESIGNED FOR THE DISCERNING MOTORIST

THE model 37-A Oldsmobile is a light weight, six-cylinder car, which embodies all the features essential and desirable in an automobile for the discerning motorist. Both the five-passenger touring car and the convertible roadster are of handsome design and smart body lines.

The chassis is extremely clean cut, sturdy and notably free from superfluous parts. It is fairly cradled on the unusually long and wide (54x2½), flat, semi-elliptic, underslung, rear springs, this producing unusual balance and forming the basis for riding comfort.

The Olds Motor Works, Lansing, Mich., presents the model 37-A as its 21st year offering with extreme confidence that it will satisfy in every respect. Special emphasis is laid upon the economy of this car.

"To drive an Oldsmobile Six," states



Model 37-A Oldsmobile.

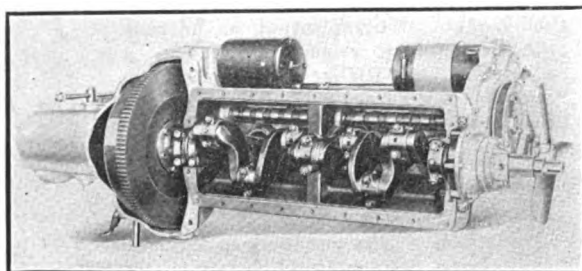
the announcement, "is to experience complete confidence in its ability to render perfect service under all conditions. When idling along the motor operation is delightfully smooth and quiet. Then a slight touch of the accelerator and the quick response tells the story of speedy getaway and immense power under perfect control."

The wheelbase is 112 inches and the weight 2400 pounds. The engine is a six-cylinder, valve-in-head, high speed motor, with balanced crankshaft and light reciprocating parts, developing 44 horsepower. The cylinders are cast en bloc, with detachable cylinder head and three-point suspension. The crankshaft is heat treated high-grade steel, with curved crank cheeks. The connecting rods are light weight, drop forged rods, with large bearings. The camshaft has cams integral and three large bearings.

Other specifications include: Cooling, water cooled by centrifugal pump; radiator, honeycomb with nickel finished

jacket, special Oldsmobile design; lubrication, force feed, through drilled crankshaft, with pressure gauge on instrument board; electric system, starting, lighting and ignition with separate units; storage battery, six volt type, under front seat; carburetor, automatic compensating type; gasoline system, vacuum feed type; transmission, unit with motor, selective type, center control, with three speeds forward and reverse; clutch, leather faced cone type; frame, cold pressed steel, channel section seven inches; front axle, I-beam with taper roller bearings; rear axle, spiral bevel type, full floating, with pinion and differential demountable, pressed steel housing with cover on rear; brakes, service brakes external contracting, emergency brakes internal expanding, adjustable by thumb nut; wheels, selected hickory with natural wood finish; springs,

front, semi-elliptic, two inches wide, 36 inches long; rear, semi-elliptic, underslung, 2¼ wide, 54 long; steering gear, steering column nickel finished, bolted to dash, walnut wheel, 17 inches in diameter; body, torpedo type, long, unbroken sweep of lines from radiator to tail lamp; fenders, crowned type.



Oldsmobile Crank Case.

SAYS NEW CAR OWNERS AID GOOD ROADS MOVEMENT.

"According to figures recently compiled in Washington," states T. W. Cushing, general sales manager of the Maibohm Motors Co., Sandusky, O., "only one-eighth of the public roads in the United States have been improved. The total length of these roads is 2,478,552 miles, of which 399,135 miles are improved with some form of surfacing. A large portion of this mileage is, however, composed of sand, clay, gravel, or water bound macadam, much of which is proving inadequate for present day traffic."

"From our Maibohm dealers all over the country come reports to the effect that with every car sold one more recruit is added to the good roads people. It is of immense satisfaction to us to know that the 7500 light sixes we are selling each year are aiding in this great movement."

CHANDLER FACTORY USES AIR- PLANE DELIVERY FOR PARTS.

Express companies and the mail service proving inadequate to get parts from Chicago to the Chandler Motor Car Co., Cleveland, the factory, determined to keep up production, is now employing airplanes to deliver parts between these two points.

Production troubles in Chicago, where sockets and plugs for Chandler head lamps are made, caused a serious shortage recently of these small but very necessary articles. Things looked bad at first, but finally almost normal production was resumed, and everything would have been fine except for the need of fast transportation service between Chicago and Cleveland.

Efforts to get these parts through speedily enough to catch up with production were of no avail. Regular special delivery mail, railway express, and even baggage, were not adequate because the sockets and plugs were not being made fast enough to permit big shipments at sufficiently frequent intervals.

Some rapid means of transportation had to be found immediately if Chandler production was to be maintained without a break. It was then that the Chandler factory management hit upon the idea of airplane delivery and this method of transportation was immediately adopted. Now sockets and plugs for Chandler head lamps are being delivered by airplane delivery mail.

This incident shows clearly that producers of motor cars are sparing no expense in overcoming the many production difficulties which most factories are experiencing.

SUTHERLAND SUCCEEDS CURTISS.

R. W. Sutherland has been elected general manager of the Splitdorf Electrical Co. to fill the vacancy caused by the resignation of C. W. Curtiss. Mr. Sutherland retains his title of secretary of the big electrical ignition company and will carry on the dual duties of office. F. C. Manning becomes vice president of the company and will continue in charge of factory sales. Mr. Sutherland, the new active head of the \$10,000,000 corporation, has been identified with the company for several years as Pacific coast branch manager, as European representative and more recently as director of branches and secretary of the parent company.

The company has declared the regular quarterly dividend of 1¼ per cent. on the preferred stock of the company issued on or prior to Sept. 1, 1919, to holders of record as of Nov. 12, 1919.

A letter received by the United States secretary of war from the British government quotes the British ambassador in a report to the British government in which several prominent Americans are warmly commended for the aid they gave the British government during the war. The list includes Col. J. G. Vincent, vice president of engineering, Packard Motor Car Co.

DIRECTS HAYNES ADVERTISING.

Gilbert U. Radoye has become director of advertising of the Haynes Automobile Co., Kokomo, Ind. Walter P. Hanson, newspaper man and writer, has been made assistant director of advertising.

TIRE CONSERVATION MEETINGS HELD BY GOODYEAR.

A new education idea that is securing results in bringing home to motorists the important lessons of tire care is the tire conservation day program that has been developed by the Goodyear Tire & Rubber Co. This idea is right in line with the spirit of economy which motorists must practise to get the greatest possible mileage from their tires. It swings on the salesman as a pivot. Goodyear salesmen in all sections of the country are qualifying as tire experts and officiating at these various conservation day meetings.

A special trunk containing the supplies necessary to the demonstration is routed ahead to the point desired. Sections of tires showing the well known forms of abuse, crude rubber of various types, sections of used tires that have given good mileage, photographs of manufacturing processes, booklets and other tire literature are among the contents of the trunk.

After suitable announcement has been made these meetings are held at the business places of Goodyear dealers. The motorist is given a wealth of helpful advice as to how to increase tire mileage and is asked to measure his tire cost in terms of miles rather than in initial cost.

Fabric and cord construction are demonstrated, bringing out the superior qualities of the cord tire. Such significant points as over size, added rubber, on-air cure and wrapped tread are emphasized. Special attention is paid to the matter of caring for tires, giving them a fair show that they may deliver the mileage that is built into them at the factory.

The many neglected conditions that prematurely ruin tires are considered and explained. With each form of tire abuse considered a tire section is exhibited, showing its ultimate effect. In October 217 of these meetings were held, with an average attendance of 98.

FORD NEARS PEAK PRODUCTION.

The factory of the Ford Motor Co., Detroit, is rapidly getting back on pre-war production and the output of cars is again touching the high point. Ford officials express confidence that beginning this month the daily average output of cars will be 4000, a figure they have been striving for, and that the number for this year will exceed 1,000,000. To produce this enormous output of cars requires the services of approximately 40,000 men. The number now on the Ford payroll, which includes the automobile, ship building, blast furnace and carburetor plants, is 53,650.

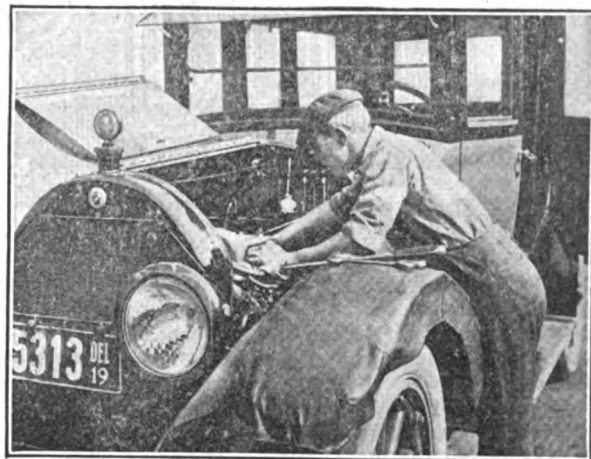
AID N. A. D. A. WORK.

The National Automobile Dealers' Association announces that the work of the association has been of such benefit to the trade that a number of the largest dealers and distributors in big cities have made voluntary proposals to subscribe to an endowment fund for further extension of the association's activities.

NEW COVERING WHICH PROTECTS FENDER DURING REPAIRS

PROPRIETORS of garages, the opinions of many car owners notwithstanding, do not like to be called upon to make frequent embarrassing apologies for scratching, marring and otherwise blemishing of the varnish on their fenders, hoods and car bodies while undergoing repairs in their shops.

The accompanying illustration shows what a new fender protector looks like. It is made of a leather substitute consisting of a strong cotton fabric base coated with pyroxylin "dope." It has a pocket along the outside edge into which the edge of the fender is inserted. A flap on the cover runs down on the inside in such a way that the fender is entirely covered while the mechanic is



New Fender Protector for Use While Car Is Undergoing Repairs in Garage.

leaning over it to work inside the hood. Thus the buttons on his clothing cannot scratch the varnish, nor is any harm done if he drops a tool or lays it down on the fender.

PLAN CONFERENCE TO CONSIDER UNIFORM AUTO LEGISLATION.

Uniform automobile legislation throughout the entire United States will be the aim of a Conference Clearance Committee, composed of representatives of automobile associations, to be held in New York. This will be a round table conference composed of representatives of the National Automobile Chamber of Commerce, the National Automobile Dealers' Association, the Motor and Accessory Manufacturers' Association, the American Automobile Association and the Trailer Manufacturers' Association of America.

It is the purpose of this conference to devise general legislative principles and for the attorneys of the various associations concerned to draw up proper uniform laws which could be submitted to the legislatures of the various states and adopted so that an automobilist going from one state to another would find himself obeying the laws in all states.

SCRIBNER WITH BUSINESS SERVICE CORPORATION.

Charles F. Scribner, formerly engineer with the Colt's Patent Fire Arms Manufacturing Co., Hartford, Conn., and more recently consulting engineer for L. V. Estes, Inc., Chicago, has become associated with the Business Service Corporation of America, Chicago, in the capacity of vice president and chief engineer.

The New York distributing rights for Gill piston rings have been placed in the hands of the Gill Piston Ring Corporation, 1864 Broadway, instead of the Schade-Phelps Corporation, as in the past.

OUTLOOK CO. OPENS OFFICE IN NEW YORK CITY.

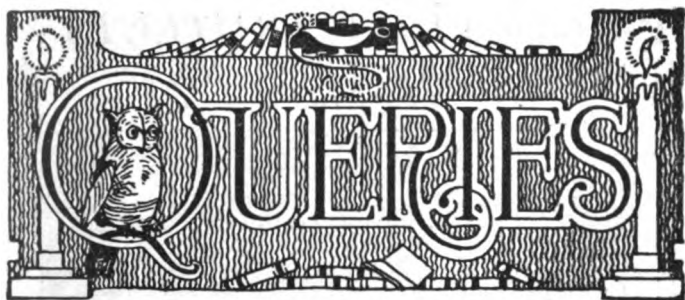
The Outlook Co., Cleveland, O., maker of Outlook windshield cleaners, Outlook rubber patch and Outlook luster, has established a sales office at 250 West 54th street, New York. This will be known as the eastern and export sales branch and will take care of all business in the New England states and in the eastern and southern states as far as Tennessee. It will also care for the company's growing export business throughout the world.

CASEY BECOMES EASTERN SALES HEAD FOR NORWESCO.

V. V. Casey, who has been representing the Northwestern Chemical Co., Marietta, O., manufacturer of Norwesco "Chemically Correct Utilities" in the southeastern states, was recently promoted to eastern sales supervisor. Mr. Casey is an experienced salesman of automotive equipment and will now have charge of the entire eastern territory from Canada to the gulf. Mr. Casey will have a large sales organization under his direction.

Stockholders of the Bethlehem Motors Co. are to vote on a proposal to increase the capital stock from 130,000 shares to 200,000 shares. The proposed issue of 43,334 shares will, if ratified, be offered at \$28 a share on the basis of one new share for every three shares of record Dec. 12.

A National Motor Vehicle Day is planned by the National Automobile Dealers' Association. The object is to concentrate public attention upon the importance of the automobile in every day life and as a transportation medium.



CHALMERS '14-24 MASTER SIX.

(R. R. M., Chelsea, Mass.)

Will you kindly mail me a wiring diagram showing the wiring connections of the starting and lighting system used on the Chalmers '14-24 (Master Six)? Is it possible to put an ammeter on this car so that I may see the rate of charge and discharge? How is the gasoline pressure gauge connected? How could I adjust the oil pressure gauge which only shows two pounds pressure, regardless of the engine speed? Is there any way to tell the oil level for this engine when filling the reservoir?

There is no practical way of attaching an ammeter to this car, as the Entz starting and lighting system is not designed for such installation.

The gasoline gauge is connected directly to the fuel pipe line between the main supply tank and the carburetor. The

ture, seen from the driving end. This is usually indicated on the oil cover of the magneto by an arrow. The magneto must be driven in this direction to have the segments of the distributor correspond with the opening of the circuit breaker. If the armature is to be driven in the opposite direction the parts must be changed accordingly.

WEAK STORAGE BATTERY.

(N. M. H., Lynn, Mass.)

I have a 1917 Maxwell. My storage battery is about exhausted. Is there anything I could substitute for the battery to get light and start the car by hand? I have had my valves ground, tappets adjusted, etc., but still have a tapping noise. Why is that? There is a dull sound when I shift gears from intermediate to high that ceases after I have driven several miles. Again, if I have been coasting, when I put my foot on the accelerator I do not get the gas right away. When my engine is running idle, throttled all the way down, it misses. What are the causes of these conditions?

We believe that the conditions you mention are caused by the storage battery and the setting of the carburetor. As to a substitute for a storage battery, take your car to a battery service station and have the battery removed and a rental battery put in its place. The cost of renting a battery for two or three days is small, and, meantime, have your battery recharged if it can be restored. Otherwise, purchase a new battery. The service station repairer will advise you.

The tapping noise is probably caused by one or more of the valve tappets being in need of adjustment. The adjusting is best done when the engine is warm, for if adjusted cold the metal will expand as heated and so vary the adjustment that the valves may be held open, causing the cylinders to skip. The dull sound you mention is probably an engine knock. This might be caused by the gas flowing slowly when coasting, lagging when the accelerator is used at the end of the coast, although you have an air leak in the intake manifold at the gaskets.

Engines rarely run with a low throttle without skipping unless the carburetor is set for both high and low speed. The condition of the gas, whether or not the carburetor has a

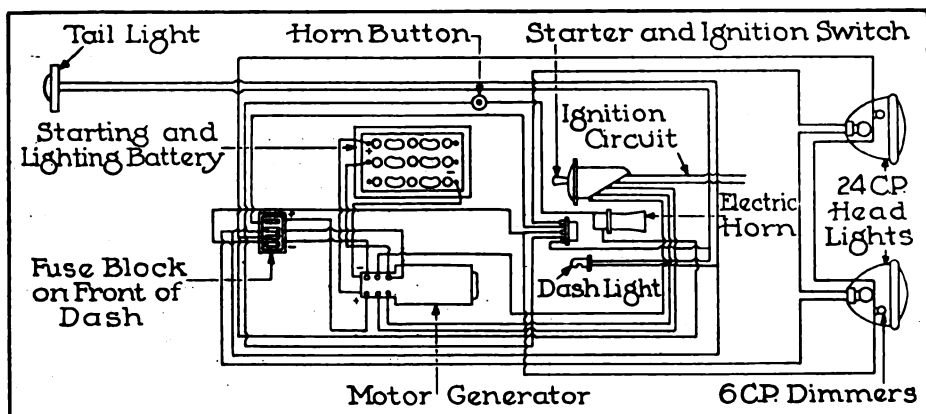
stove on the exhaust pipe connected to the air inlet of the carburetor by a flexible tube supplying the carburetor warm air, will cause this trouble.

LOSS OF COMPRESSION.

(J. S. S., Rutland, Vt.)

I recently decarbonized my engine and put in a new head gasket, which I know to be perfect, but did not grind the valves as they seemed all right. Two cylinders now show poor compression, although they were previously tight. How can I tell whether the rings or the valves leak?

Take a piece of rubber tubing or hose and insert one end well into the crank case breather or oil filling spout. Remove all spark plugs except that of the cylinder being tested and have this cylinder cranked over compression, while some one listens at the free end of the rubber tube. If the rings leak, you should hear a hissing sound of the escaping air into the crank case. By inserting the listening tube into the carburetor air intake and cranking the cylinder over, the blow back of the air through a leaking inlet valve can usually be detected, but without disturbing the piping, this test cannot be applied to the exhaust valve. If you have disturbed the push rod adjustments, perhaps some of the rods may be so close they hold their valves open. Look out for particles of carbon on the valve seats and remember that unless oil has fully worked in under the rings they cannot be tight.



second pipe seen at the main tank is for the use of the pressure pump located on the dash and at its forward end carries a relief valve, this pipe supplying pressure from the pump to the tank.

No adjustment of the oil gauge is provided for. At high speeds this gauge should show a pressure of three to 10 pounds. At slower speeds it will drop to one or two pounds, almost reaching zero when the engine is idle. Failure of the gauge to show pressure in ordinary driving speed indicates that the oil screen is clogged. Chalmers repairers sometimes remove the side of the oil pump and fit a thin washer between the hub of the driven gear and the side of the case, to force the gears closer into mesh and circulate a larger volume of oil.

On the Chalmers '14-24 (Master Six) the height of the oil in the reservoir is shown by two petcocks on the side of the engine base, just forward of the pump shaft housing. The upper petcock shows the high level and the lower petcock the low level.

One may check the oil flow at the oil filter, located on the left side of the engine. The cover of the filter may be removed and the flow of oil noted when the engine is operating. The cover must fit tight else oil will not flow with pressure beyond this point. Note if the gasket is in good condition.

MEANING OF CLOCKWISE AND ANTI-CLOCKWISE.

(H. A. C., Lakeville, Ill.)

What is meant by "clockwise" and "anti-clockwise" on a magneto? Could both types be used on the same engine?

These terms refer to the direction of rotation of the arma-

ENGINE STARTING IS DIFFICULT.

(T. A. M., Lebanon, Pa.)

I have a 1917 Bell car with Lycoming engine which I have driven 10,000 miles to date without any failure. During cold weather and even in summer months, I have had great difficulty in starting. I prime the engine by squirting gasoline into the compression relief cocks, pull out the priming rod, jack a rear wheel, crank by hand and have tried everything I have been told will facilitate starting. But no matter what the method, it is necessary to press the starter switch for fully five minutes before the motor will start the engine. The Gray & Davis starting and lighting system is on the car. Would any of the cold weather priming devices serve me to advantage? Have recently had a new Presto-Lite battery installed.

The cause is not the starting and lighting system, but probably is the carburetion. You have driven your car for 10,000 miles without failure and the valves or piston rings are probably worn. Possibly grinding the valves would restore the engine. Though you do not mention the fact, this work has not been done for some time. The condition seems to be loss of compression, due to leaky valves or piston rings. Examine the gaskets between the carburetor and intake manifold, where a leak will dilute the gas and will result in slow starting. Also examine the gasket between the intake manifold and the engine for air leaks for the same reason.

It is barely possible that the mixture of your carburetor is adjusted too lean for cold weather. Opening the needle valve slightly will correct this and will give your engine a richer mixture.

Numerous devices are obtainable that are designed to facilitate engine starting in cold weather. Some of these are better than others. You can determine which one will serve to the best advantage on your engine and try it.

If after adjusting the needle valve of the carburetor and tightening the gaskets you do not get reasonable results, have the valves ground. If the engine still starts hard, have a good repairer disassemble it and note the condition of the piston rings and the walls of the cylinders. If the cylinders are scored or grooved, they may be filled by one of several processes, either by plating with a silver process, reboring and fitting over-size pistons and rings, or by the Wizard process of filling the grooves or scores.

If the rings show black where the gas has leaked, fitting new rings will probably restore the cylinders to normal.

WELDING CRACKED CYLINDER WALL.

(O. I. C., Springfield, Mass.)

Could a leaky engine cylinder wall be welded as strong as it was before it cracked, and will it hold compression? Will I be able to get as much speed and power as before, without any change?

It is always best to weld a broken cylinder to make absolutely sure of the work. Welding can be done so that you will not be able to detect the repair in the metal. If the stock is not large a leak can sometimes be stopped by filling with an iron cement, known as "Smooth On." This material hardens and is often used for repairing leaks in steam and water mains. It has also been used successfully for repairing gas engine water jackets. If you cared to you might try rusting filling the crack, which is sometimes successful. For this work use a solution of the proportions of a quarter pound of sal ammoniac in one quart of water. The solution should be left in the water jacket for about three days. Then wash out the solution thoroughly, as it may damage the copper of the radiator.

STARTING WITH A COLD ENGINE.

(H. E. R., New York.)

My engine sputters and misfires when I start it, but later runs well. What is the cause of this?

The cause is undoubtedly due to it being cold. The gasoline and air are chilled and the former does not vaporize readily. After the engine becomes heated the gasoline vaporizes more readily, affording a better mixture, and the engine does not miss explosions. Go over the hot air pipe carefully to see that it does not allow cold air to enter and chill the air coming from the hot air stove on the exhaust manifold.

(When Writing to Advertisers, Please Mention the Automobile Journal.)

FULL SPRING ACTION

Absorbs all road shocks
Protects chassis mechanism
Insures riding comfort
Increases fuel and tire mileage
Decreases operating and maintenance cost

Spring Rusting Is Certain

It is the greatest and most general cause for car deterioration.

BROWN SPRING OILERS

Are a positive protection of any automotive vehicle. They contain oil reservoirs that automatically lubricate the springs to the exact degree that will insure full resiliency.



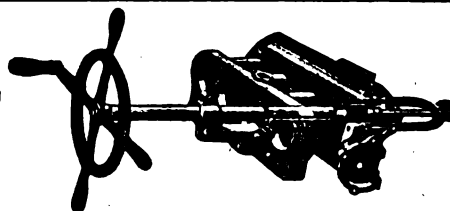
Can be installed by any owner. Sold by all dealers with ironclad guarantee of satisfaction.

Booklet on car and spring care sent at request.

Brown Spring Oiler Company

6913 CARNEGIE AVENUE, CLEVELAND, OHIO

Repairmen,
Listen!



Patented May 19, 1914; Dec. 15, 1914; June 20, 1916; June 26, 1917.
The Heiser Improved Cylinder Reboring Tool for FORD MOTORS is the only reboring Tool in the world that is self-sharpening. It is the only tool that rebores between centers—this insures a finished cylinder, square with the crankshaft, round, straight, true and free from taper. It is adjustable and the only tool that will rebore different sizes without losing the adjustment. The best mechanic in the world can't build reputation without proper TOOLS and EQUIPMENT. THE HEISER IMPROVED CYLINDER REBORING TOOL makes good shops out of poor ones and better shops out of good ones. Write today for full particulars.

HEISER SPECIAL TOOL CO., 216 Rogers Bldg., Kingston, Mo.

Tarvia

**PREVENTS DUST
PRESERVES ROADS**

Booklets on Request

THE BARRETT COMPANY

New York Chicago Philadelphia Boston
St. Louis Cleveland Cincinnati
Pittsburgh Detroit Birmingham Kansas
City Minneapolis Nashville Salt
Lake City Seattle Peoria





*All That Its
Name Implies—*

THE HEIGHT OF PERFECTION

You cannot secure more efficient and economical carburetion than by the Zenith. Simplest to adjust, and once adjusted stays adjusted.

Known the world over as the

ZENITH OF CARBURETOR EFFICIENCY

A long list of American builders of cars, trucks and aeroplanes believe this simple, plain tube device to be the best insurance for permanent carburetor satisfaction.

Zenith Carburetor Co.

New York Detroit, U. S. A. Chicago

FORD ENGINE STARTS HARD.

(H. J. B., Everett, Mass.)

I have a Ford runabout that was recently overhauled. After it is started the engine runs fine, but the engine is very hard to start. It is equipped with a Stromberg carburetor. When starting I prime the carburetor and choke the air, but the engine will not fire until cranked 10 or 15 times and at times towing is the only certain manner of starting. When the engine is thoroughly warmed it will start with a few turns. The wiring of the ignition circuit is new and a dry cell battery is used for starting. The magneto seems to be all right and the spark plug points are the proper distance apart.

If you are positive the coils and the entire engine are in operative condition you had best obtain a primer. These can be bought at any supply house. Hard starting during cold weather may be expected with any Ford engine. The gas you are using may be low grade. Gasoline generally sold contains considerable kerosene and is not carbureted well until heated. After the engine has become warm the gas will be reasonably combustible. Ford engines start more readily when the carburetor needle valve is opened a trifle, allowing a greater flow of gasoline and a richer mixture. After the engine has warmed the valve may be placed at the original setting, or at the point where the engine idles evenly with all cylinders firing perfectly, which is best determined with the spark retarded and the throttle part way open. Quick acceleration is also desirable, and this can be tested by opening and closing the throttle quickly with the spark retarded. If the engine spits through the carburetor this is due to one of two things, either the inlet valves are not seating properly, or the air spring on the carburetor is not tight enough. More tension on the air spring is necessary if the trouble is at the carburetor and grinding the inlet valves will cure it if the valves are at fault.

DETERMINING HORSEPOWER OF GASOLINE ENGINES.

(W. R. T., Marleboro, Mass.)

Tell me through the columns of the Journal the method by which the horsepower of a gasoline engine is determined?

The engine is connected to a dynamo direct, that is by connecting the crankshaft of the engine to the armature shaft of the dynamo and the engine is then run at full output, while the power given by it to the dynamo is measured. The horsepower delivered by an engine is found by multiplying the torque or twisting force in foot pounds furnished at its shaft by its speed in revolutions per minute and dividing the product by 33,000. The dynamo used is generally of a special type, known as an electro-dynamometer, which measures the torque directly, appropriate allowance being made for electrical and mechanical power losses, and the speed is measured by a tachometer or revolution counter. The horsepower rating given to a gasoline engine is purely empirical and gives little idea as to what it actually can do. It is obtained by multiplying its cylinder bore in inches, squared by the number of its cylinders and dividing the product by 2.5. The result represents what an engine is expected to deliver when each of its pistons is moving at the rate of 1000 feet per minute.

WHEEL ALIGNMENT.

(J. E. R., Newport, R. I.)

Please advise me as to the proper alignment of the front wheels of a car. Should they be parallel or slightly closed in front than at the rear? If so how much?

The front wheels "toe in" slightly, but not more than a quarter of an inch for each wheel. This is adjusted by means of the rod connecting the front wheels. As the car travels along the wheels have a tendency to spread slightly, and this toeing in compensates this. The bottoms of the wheels should be slightly nearer together than at the tops. This relieves the spindle bolt of unnecessary strain and makes steering easier. This angle is determined by the steering knuckle and spindle and is not subject to adjustment. If it is not correct the wheel spindles should be reset.

V. A. NIELSEN CO.

708 Beacon Street

Boston, Mass.

We Do Any Electrical Auto-Repairs

*Immediate Return Reliable Work
Absolute Guarantee*

Factory Depot for
Connecticut Ignition
Dealers' Parts List Ready

N. E. Distributors
Stokes Carburetor
Agents Wanted

MAY WE DO YOUR WORK

METZ Master Six

The car of the Year

A New England Product

Honest through and through

\$1695 F. O. B. factory FULLY EQUIPPED

We are now extending our agency list
Information at request

METZ SALES CORPORATION
BOSTON, MASS.

(When Writing to Advertisers, Please Mention the Automobile Journal.)

VALUE OF PRIMING DEVICES FOR COLD WEATHER STARTING.

(J. H. R., Roxbury, Mass.)

Is there any method of improving the starting and running of automobiles during cold weather? Will a device that would improve the starting and secure good combustion in three minutes after starting be of value?

Several devices are manufactured that are claimed to facilitate starting. Nearly all of these inject gasoline, taken from the fuel supply pipe, into the intake manifold, usually at the top, where it is drawn into the combustion chambers when the engine is turned over either by the starter or the hand crank.

Nearly all carburetors are equipped with a strangling device by which a rich mixture may be drawn into the cylinders when starting the engine cold, but these devices do not improve fuel volatilization during severe cold weather, and at such times a priming device connected at the top of the manifold insures injection of fuel.

The device that seems to give best results is one that has a divided priming tube, one branch connected to the elbow of the manifold dash, while the other is connected to the elbow nearest the radiator. Holes are drilled and threaded, a nipple screwed in each elbow that has a needle tube three or four inches long that extends towards the inlet valve. The pipe is fastened to the nipples at each elbow and connected with a suitable plunger pump at the dash. When operating the gasoline is taken from the main fuel pipe by the plunger of the pump, drawn into the cylinder of the pump and forced from the cylinder out through the connecting pipe to the needle tubes, from which it is emitted in the form of a spray to the inlet valves. It is said that such a device will rarely fail to start a car, even though standing for several hours during extreme cold weather.

COMPRESSION LEAKS.

(J. E. T., Attleboro, Mass.)

If a cylinder leaks, how can you tell cause is the cylinder or a valve?

Should judge from your inquiry that you have reference to the cylinder compression leaking. Probably the best method for testing is to run the engine and flow oil from a hand oil can around the spark plugs, valve caps, compression relief cups and the cylinder head if it is a removable type. If bubbles appear tighten the parts where they are seen or replace the gaskets. If the compression is still weak, which can be determined by turning the engine over slowly by hand, remove and grind the exhaust valve and pour a half tea cup of kerosene into each cylinder. Crank the engine by the hand or by the starter to shake the piston rings loose. If the compression is still weak, the leak is probably down the sides of the pistons, due to scored cylinders or registering of the ring gaps and the cylinders must be removed to determine the cause and make restoration.

TROUBLE IN GEAR SHIFTING.

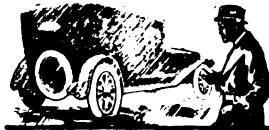
(J. T. S., Reading, Pa.)

When shifting gears from second to low speed in going up hill should the engine be accelerated before shifting? How may it be done without stopping the car? I have a car, 1915 model, and I have not been able to shift without stopping the car.

It is possible to shift the gears without stopping the car while ascending a hill. It will not be found necessary under ordinary circumstances to accelerate the engine to accomplish this gear shift, as usually the driver will not change until the engine speed is quite low, so that he may shift into the lower speed without racing the engine until the gears engage. Then the engine should be quickly accelerated. It will require quick action to make this gear shift without stalling the engine, but after a little practise the driver should be able to do this easily.

(When Writing to Advertisers, Please Mention the Automobile Journal.)

What motorists dread most—



EVERY time you get out on the road—every time you are out in a storm—you worry for fear you

will have a puncture, or two punctures, if you carry a spare. You dread the fuss and bother of fixing a tire. And out on the road you must do it yourself. Your trips often are spoiled by this fear, are they not? But if you have a LAWCO Rim Tool in your tool box you go anywhere, any time—any weather—and enjoy every minute of the drive, because you know that you can fix a puncture in a few seconds. The LAWCO Rim Tool enables you to take any split rim—any size—out of a tire in less than one minute! The hardest part of fixing a tire is made almost a pleasure.

Ask your dealer for the LAWCO Rim Tool. If it doesn't please you, he will refund your money without a question. If he can't supply you, then write us, sending his name.

THE F. H. LAWSON CO.
Dept. E.
Cincinnati, Ohio.

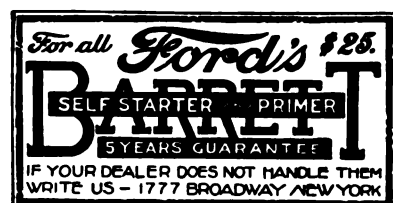


LAWCO RIM TOOL

GRANT SIX

An entirely new model—larger, handsomer, more powerful.

GRANT MOTOR CAR CORPORATION
CLEVELAND, OHIO





The Hotel Wellington

7th Avenue at 55th Street
NEW YORK

Located in the center of the Automobile industry, theaters and shopping districts, conveniently reached from all steamships and railroad terminals. The beautiful Central Park is within three short blocks of the hotel.

RATES

Room with use of bath, one person.....	\$1.50 & \$2
Room with use of bath, two persons.....	2.50 & 3
Room with bath, one person.....	2.50 & 3
Room with bath, two persons.....	3.50 & 4
Parlor, bedroom and bath, 1 or 2 persons..	5.00 & 6
Parlor, bedroom and bath, three persons..	6.00 & 7
Parlor, 2 bedrooms and bath, 3 or 4 persons	7.00 & 8

Special rates can always be arranged for extended periods on contract, and rates vary with the desirability of the quarters selected, the number of people in the party and the length of stay.

Operated under the Knott Management.

S. M. EATON, Manager.

PAIGE

The Most Beautiful Car in America

A complete line
of touring and
enclosed models.

Write for Literature.

Paige-Detroit Motor Car Co.

DETROIT, MICH.



Giant Searchlight

The highest quality lowest priced
lamp produced.

LIST PRICE With Mirror.....\$6.00
Without Mirror...\$5.00

CULVER-STEARN'S MFG. CO.

Worcester, Mass.
Detroit, Mich.

The Automobile Journal

A QUALITY MAGAZINE, WITH PRESTIGE AND CIRCULATION THAT BRINGS RESULTS TO ADVERTISERS

TIMES BUILDING :: PAWTUCKET, R. I.

(When Writing to Advertisers, Please Mention the Automobile Journal.)

TIMING LATE ON CHEVROLET.

(G. W., Buffalo, N. Y.)

I have a 1915 Chevrolet car and when the engine is idling it runs fine, but when I throw it into gear the engine has no power and the water boils. The more the water boils the less power I seem to have and the engine gets very hot.

I put in new rings and for the first 50 miles it ran all right, then the water began to boil and the engine lost power. Have cleaned the radiator and cooling system with soda, but it did not seem to correct the trouble. Kindly let me know what is the cause of my trouble?

Your trouble is apparently in your timer, that is, it is firing very late, probably caused by the timer case slipping on its drive shaft. Two set screws fasten the timer to the shaft and if these become loose or the timing is changed the results obtained will be similar to what you mention. To set the timer, proceed as follows: Turn the engine with the starting crank until the No. 1 intake valve begins to open. Piston No. 1 is then at top dead center. Remove the spark plug and insert a screw driver or rod through the spark plug opening. Continue to turn the engine until the piston again reaches top center. It is then at the top of its compression stroke and the gasses will be compressed ready for firing. Turn the switch on as in starting, slip the igniter on the shaft and connect the wires to their proper plugs, then remove the No. 1 wire from the terminal socket on the distributor case and hold it about one-quarter inch away from the brass ring of the socket.

Rotate the entire igniter assembly on the shaft in a clockwise direction, until a spark jumps from the end of the spark plug wire to the brass ring of the terminal. The igniter set screws should then be tightened and the No. 1 wire inserted in its socket. Setting is made with the spark lever at the wheel fully retarded. Firing order, 1, 2, 4, 3.

All indications that you mention point to a very late spark or to a loose impeller in the water pump. If the above does not correct the trouble, disassemble the water pump and examine the fastening of the impeller. If loose, or the pin is broken, supply a new pin. Watch the circulation of the water at the top of the radiator with the cap removed. If the water circulates freely the system is functioning. If not and the pump is operative, look for clogged passages around the water jacket of the engine. This is best removed by disconnecting the pump and radiator from the engine and flushing out with water pressure. As you say that you have cleaned the radiator with hot soda, however, this eliminates the clogged radiator probability.

ENGINE IS HARD TO START.

(L. T. J., East Bridgewater, Mass.)

I have a 1915 Ford, which was overhauled two months ago that I cannot start in neutral. The engine runs very smoothly and pulls well up hill. Kindly tell me how to restore the engine to normal as now I must jack a rear wheel each time I crank the car.

From your description the cause is probably weak magnets. The magnets need recharging or must be replaced. When these become demagnetized the spark is often so weak at low speeds that the engine can be started with difficulty. You might first try putting the spark plug points closer together, which often makes starting easier. Still another prevention of this fault would be to use a set of four dry cells in series, connected to the battery switch terminal on the inside of the dash at the back of the coil. This terminal is on all Ford coils and is usually left free from any connection.

RAIN PROOF SOLUTION.

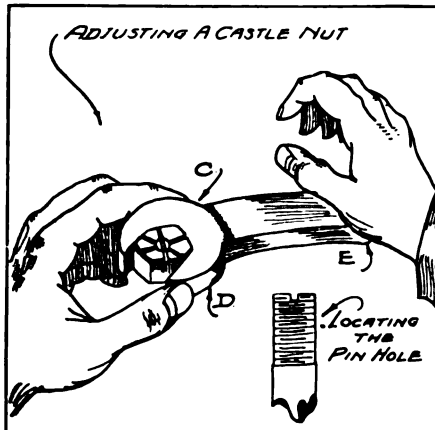
A solution that is recommended by experienced motorists for making the windshield proof against rain adhering to it is made of one ounce of water, two ounces of glycerine and one dram of salt. This should be mixed thoroughly and applied with a piece of gauze, taking care that all the strokes during application are made downwardly.

ADJUSTING CASTLE NUTS.

(C. J. H., Bangor, Me.)

Can you tell me of a way to adjust castellated nuts so that one may be sure where to put the cotter pin without guessing about it?

A simple way of doing this is to take the bolt that a castellated nut is to be fitted to and place it in a vice. Putting a nail or cotter pin in the pin hole in the bolt will show you where the line should be cut on the end of the bolt. With a file make a small slot across the head of the bolt parallel with the cotter pin. This line will give you something to go by later when you are putting the nut on and tightening it in place.



The diagram shows how to adjust a castellated nut. Place the wrench securely upon the nut, then hold the tool with the thumb and fingers of one hand, as shown at C and D. Using the fleshy part—near the base of the thumb—of the other hand as a driver, strike upon the end of the wrench, as shown at E, and the impact of the blows, though seemingly light, will drive the wrench forward and move the nut a very short distance at a time until it is brought squarely with the pin hole in the bolt.

The same method may be used in removing a castellated nut when the bolt turns around under the direct turn of the wrench.

DIFFERENTIAL MAY BE JAMMED.

(E. O. M., Brookline, Mass.)

I have a 1917 Studebaker Big Six I purchased from a used car dealer. When I drive with the spark advanced the car jumps forward, and only stops when I retard the spark about one-quarter of the way. When I turn corners the back of the car almost turns over when I am moving but five or six miles an hour and slightly open the throttle. The car skids on dry pavement when turning.

From your letter it would appear that the differential gears jam and do not freely function, causing one wheel to skid when you turn. This will cause unusual wear of your tires and should be restored at once. The differential is designed so one wheel may turn faster than the other when turning, and that the car skids even on a dry pavement would indicate its differential is not freely operative.

Another cause might be that the axle is bent so the rear wheels run out of line. This would be evidenced by the greatly increased wear of the rear shoes. Take the car to a Studebaker service station and have the axles straightened or new axles fitted in their place.

The fact the engine jumps when the spark is fully advanced cannot be connected with rear axle conditions. The cause will probably be found in the breaker box and from the points being too far apart, so the engine misses or skips on one or more cylinders. This can be corrected by having the breaker points set. The proper position for the spark lever for normal operation is fully advanced, and more especially so for a six engine. Setting the points of the breaker box closer will probably prevent the jumping mentioned.

(When Writing to Advertisers, Please Mention the Automobile Journal.)



A FORCED LANDING

"THE car worked fine, but we were forced to stop several times to let the engine cool off." Ever make such an admission? Overheating, with a National Zig Zag Radiator is unheard of. Increased water circulating space and greater cooling surface is the reason.

NATIONAL ZIG ZAG RADIATOR

DEALERS.

We are now in position to offer you an attractive agency proposition. Full information upon request.



\$28.00

F. O. B. Detroit—Finished in either nickel or black enamel. Shipping weight complete 35 lbs.

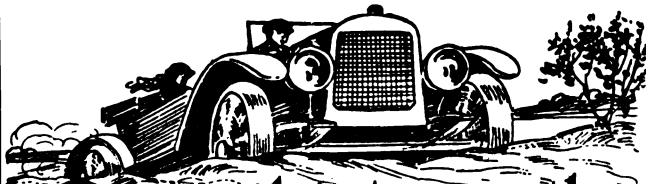


NATIONAL ZIG ZAG RADIATOR

AND in the winter time you are equally free from freezing and steaming annoyances. Unusual expansion and contraction flexibility takes care of this. Reduced gasoline and oil consumption are natural benefits.

Let us put you in touch with our nearest dealer.

NATIONAL CAN COMPANY
DETROIT (Radiator Division) MICHIGAN



TRADE MARK REGISTERED IN
NON-FLUID OIL
UNITED STATES PATENT OFFICE

DURING the hardest climbing **NON-FLUID OIL** adheres closely to hard working gears and bearings—lubricating them perfectly—reducing wear and gasoline consumption.

Ask your Dealer for
"K-00 Special" for gears
"K-000" for all bearings

New York & New Jersey Lubricant Co.

165 BROADWAY, NEW YORK

COES *The Standard WRENCH*



WRENCHES that are made for the hardest service. They do not break but grip and hold and their efficiency never lessens.

Economy tools as they last longer, give better service and never become useless through wear.

Utility wrenches of the highest order for car owners and repairers as they can be used in compact places and once set hold like a vise.

*The Best Wrench
The Cheapest*

All dealers carry in stock the exact size to meet your need. They recommend Coes Wrenches as all good dealers have for more than fifty years.

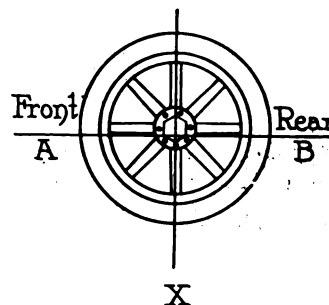
COES WRENCH COMPANY
WORCESTER, MASS.

ALIGNING FRONT WHEELS.

It is absolutely imperative that the front wheels line, or track, properly; that is, the wheels must be parallel to each other and at right angles to the axle. If this condition does not exist, tire wear will be rapid and steering will be difficult.

It is good practise to test the wheel alignment at least once a month. There are several methods, but the one shown in the accompanying illustration is simple and accurate.

The sketch shows the inner side of a front wheel. At an equal distance from the ground draw a line as near to the center of the wheel as possible. The line should be made exactly on the center of the rim, but ordinarily the frame and dust pan prevent the extending of a gauge between the wheels at this distance. It is obvious that when both wheels are marked as shown, the alignment is easily ascertained.



X, Simple Plan for Testing Alignment of Wheels.

Many experts advise a slight toeing in of the front wheels, in which case the distance from A to the corresponding point of the opposite front wheel should be $\frac{1}{4}$ of an inch less than the distance from B to the corresponding point on the rear of the opposite wheel.

REAR WHEEL THROWS GREASE.

(T. A. S., Taunton, Mass.)

Kindly let me know if there is any way to stop a rear wheel from throwing grease. Have a 1919 Ford car and have just put new felt retainers between the wheels and the bearings and also changed the washers outside of the felts. This does not prevent the leakage. Both rear wheels are alike, but the right wheel only throws grease. What is the cause of this condition?

The fact that the right wheel only throws grease shows that you drive much of the time on the right side of the road. In cars other than Fords this condition does not obtain. The reason is that the end bearings of Ford cars are fitted with washers of felt between the hubs of the wheels and the bearing on the shaft just inside of the wheel hubs. When end play develops in the differential gearset and the axle moves endways in the bearings, the pump-like motion of the axle forces grease from the differential housing along the shaft and through the bearing to the felt retainers. If the retainer is worn grease is forced through and around it on to the brake drum and is thrown by centrifugal force to the outer edge and eventually reaches the outside of the drum, where it gathers dust and dirt. The only preventive for this condition is to disassemble the rear unit and put in new thrust washers each side of the differential gear to take up the lost motion. A simpler method usually employed is to remove the wheel from the axle and take off the cap covering the end of the roller bearing and the felt oil retainer. Fit a new washer around the axle shaft. If the felt is thin, make a second washer and fit the same as the first, replacing the cap and forcing it if necessary. Replace the wheel and force it against the cap and felt washer with the nut on the end of the axle. After the car has been driven for 30 days, remove the hub cap and tighten the nut, this will take out whatever play is in the hub and still further tighten the hub against the felt washer.

DIXON'S
GRAPHITE
Transmission and Differential
LUBRICANT

You get more miles, smoother miles, faster miles, easier miles, less-wearing miles, more economical miles with this Dixon Lubricant in your transmission and differential.

Write for Booklet No. 210-G.
Also ask your dealer about Dixon's famous Cup Grease.

Made in Jersey City, N. J. by the
JOSEPH DIXON CRUCIBLE COMPANY
Established 1827

**NEW DEPARTURE
BALL BEARINGS**

*Strength
Stamina
Service*

The New Departure Manufacturing Co., Bristol, Conn.
Conrad Patent Licensees

(When Writing to Advertisers, Please Mention the Automobile Journal.)

SUPREME AUTO OIL

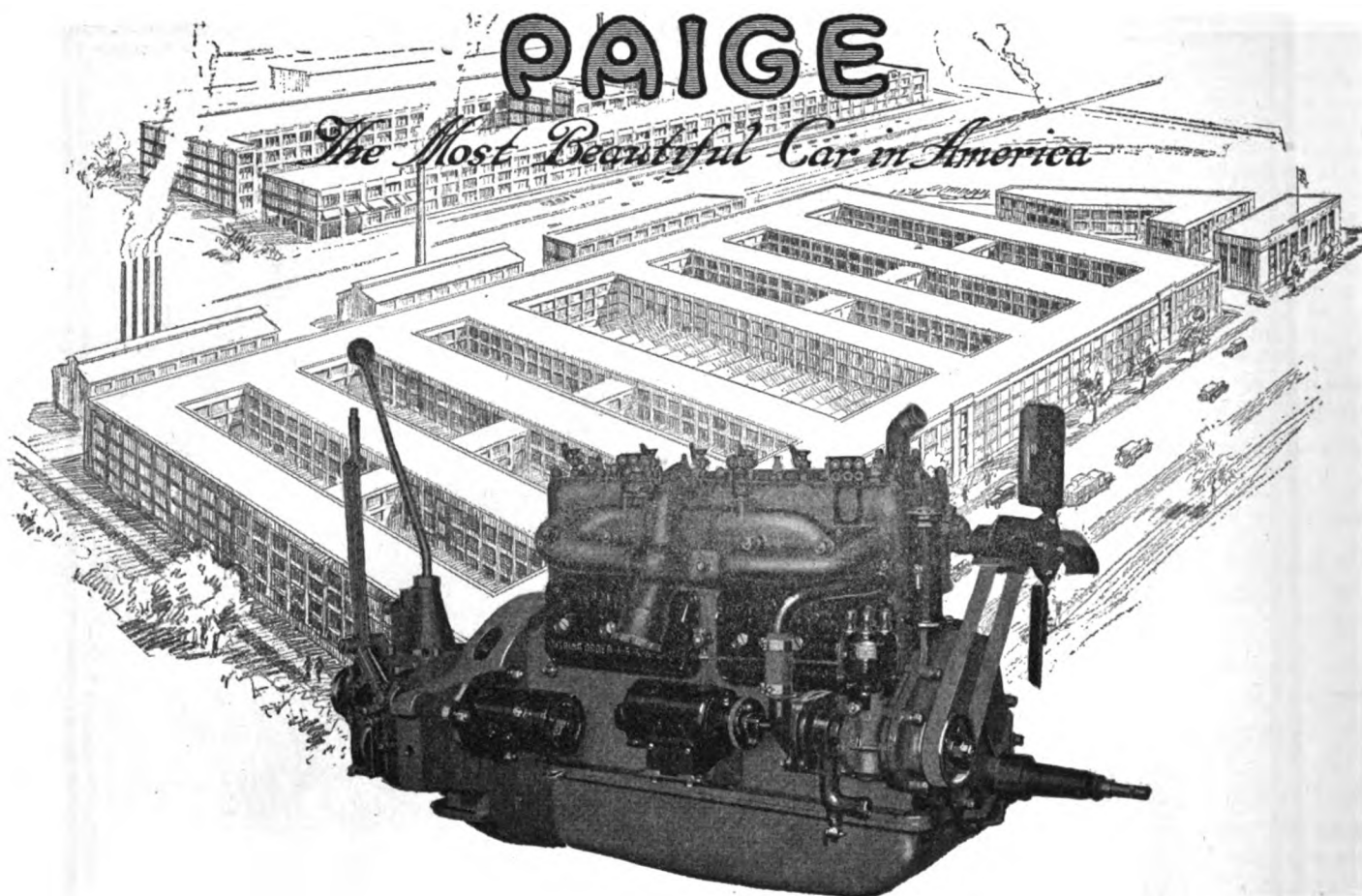
**FLOWS
FREELY
AT ZERO
COLD WEATHER
LUBRICATION**

THE blanket won't protect your
crankcase—but it will need no
protection if filled with

SUPREME AUTO OIL

See your Dealer

GULF REFINING CO.
Pittsburgh, Pa.



A New Paige Motor

For three years the Paige engineers have been devoting their efforts to the development of a New Six-cylinder motor. With every facility for research and experiment, these men have worked with one definite object in mind—the production of the most efficient power plant in the world.

That motor is now an accomplished fact. It has passed from the laboratory to the road and there it has been tested mercilessly and continuously. It has been subjected to every stress and strain that brutal driving might suggest, but in each instance it has emerged with a flawless record.

These long, exhaustive tests have convinced us that

the new Paige Motor is indeed the most efficient of all light sixes. In economy of operation, hill climbing ability, acceleration and flexibility, it has far surpassed any power plant developed by this organization.

Best of all it is an original Paige product—conceived by Paige engineers and built by Paige mechanics in the Paige shops. In it we have incorporated every approved feature that is known to automotive engineering.

In brief, it represents the sum total of current engineering knowledge. It expresses accurately and completely the tremendous strides of scientific development during the entire war period. It is a strictly modern achievement—a product of the combined genius of two continents.

PAIGE-DETROIT MOTOR CAR COMPANY, DETROIT, U. S. A.

"Manufacturers of Paige Cars and Motor Trucks"

PAIGE

The Most Beautiful Car in America

A New Paige Car

The war has taught American manufacturers many valuable lessons. In the past three years, for instance, we have developed an entirely new conception of precise manufacturing in large scale production.

You will find a striking example of this practise in the New Paige "Glenbrook" model.

The scrupulously accurate methods that were applied to delicate Government mechanisms are now producing every unit of our car.

With the closest inspection, vastly increased equipment and much broader experience, there could be only one result—a highly refined, highly standardized product.

One ride in the "Glenbrook" tells an eloquent story of finely-balanced construction. The smooth, even power of the motor sweeps you along without a suggestion of vibration or mechanical noise. There is merely a gentle purr from the exhaust as the car glides on its way with the buoyancy of an aeroplane.

All road shocks and jars are immediately absorbed in the velvety spring suspension.

There is no danger of sway or "side slip" no matter what the speed may be, for every ounce of weight in the chassis is distributed with scientific precision.

Inside the car there is body room, leg room and elbow room for five adult passengers to travel in luxurious comfort.

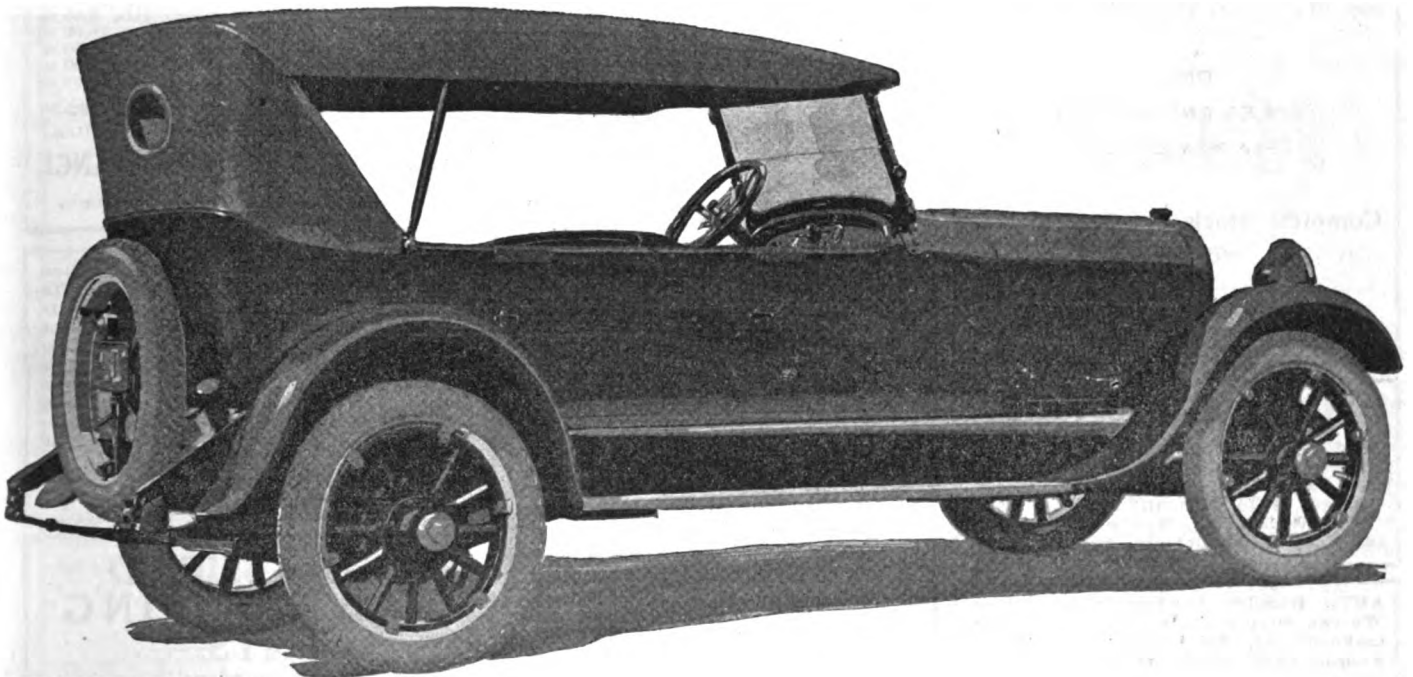
The upholstery is soft and inviting—the equipment and general appointments throughout are the best that money can buy.

So far as the design is concerned you of course know what to expect for this is "The Most Beautiful Car in America."

The "Glenbrook" model is our latest achievement. We merely ask you to see it—ride in it—drive it—and form your own opinion. We shall be quite content to abide by the result.

PAIGE-DETROIT MOTOR CAR COMPANY, DETROIT, U. S. A.

"Manufacturers of Paige Cars and Motor Trucks"



(When Writing to Advertisers, Please Mention the Automobile Journal.)

TRADE OUTLET

TIRES

JOB LOTS

Obsolete, Surplus Stocks and
Factory Seconds

WRITE—CALL

BROADWAY TIRE JOBBERS

250 West 54th Street

New York

TIRES AND TUBES

Demonstrating and Factory Repaired.
Economy, Quality, Price. All
Standard Makes. No Junk. Satisfaction Guaranteed.

Size	Tires	Tubes	Size	Tires	Tubes
30x3	\$5.00	\$1.35	36x4	\$9.00	\$1.75
30x3 1/2	6.00	1.45	34x4 1/4	9.25	1.75
32x3 1/2	6.50	1.50	35x4 1/4	9.50	1.80
31x4	7.25	1.65	36x4 1/4	9.75	1.85
32x4	8.00	1.60	35x5	10.50	2.00
33x4	8.75	1.70	37x5	11.00	2.20
34x4	8.75	1.70			



Write for Prices on Odd Sized Tires. **TERMS:**
\$1.00 deposit with each tire ordered, balance C. O. D. subject to inspection. Specify style of rim to avoid delay. Although used tires are not guaranteed for any definite number of miles, we guarantee our tires to give the best service in proportion to the prices paid, or reasonable adjustments are made.
LIBERTY TIRE CO., 2119 So. Michigan Ave., Dept. I, Chicago, Ill.

AUTO PARTS.

50% to 90% Off List.

24 Hour Service. Unlimited Stock.

Pope-Hartford, Columbia, Reo,

Overland and 200 other makes.

Motors, \$20.00 up; E. Presto Tanks, \$4.00

Magnetos, \$3.50 up; B. Presto Tanks, \$4.75

Cylinders, \$3.00 up; Bearings, 50c up

Springs, \$1.00 up; Rims, \$1.00 up

1000 Other PARTS Bargains.

If you want any part not listed here,

Write Us—We Have It.

Conn. Auto Parts Co., Inc.

18-20 Morgan St., Hartford, Conn.

Atwater-Kent Sales Co., of New England

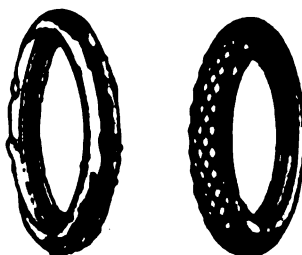
883 BOYLSTON ST., BOSTON, MASS.

Official
SALES AND SERVICE
For New England.

Complete stock of parts always
on hand.

Write for Price List.

BOSTON RETREAD TIRE CO.



Before

After

OUR METHOD OF RETREADING IS
DIFFERENT FROM OTHERS.

We use all Goodyear first quality stock
and retread bands and can absolutely
guarantee from

3000 to 3500 Miles.

We will replace a new tire for every
one that our work does not give satisfaction.

Tires called for and delivered. We pay
express charges one way on all out-of-
town orders.

Price List Mailed Upon Request.

BOSTON RETREAD TIRE CO.

70 Clarendon St., Boston, Mass.

Auto Mailing Lists

Send for our free complete Price List
covering Auto Dealers, Owners, Ford
Dealers, Truck Dealers and Owners,
Garages, Auto Mfrs. and etc., any state.
A. F. WILLIAMS, Mgr. of List Dept.
168 W. Adams St., Chicago. Franklin 1183.

AUTO PARTS—At Your Own Prices.
We can supply parts for nearly every
make of car. 648 Packards, Interstate
Fours, also Truck parts, GMC and
other makes.

Write us for Parts. We have them.

STRANDWAY AUTO PARTS CO.,
193-195 H. St., South Boston, Mass.

LOZIER OWNERS—Why buy counterfeit
repair parts. We have all Original Parts.
Made from original Patterns. Order
from headquarters.

LOZIER MOTOR CO.

Fort and 6th Sts., Detroit, Mich.
Service Stations—E. A. Cornely, Inc.,
1445 Bush St., San Francisco, Cal.
Lozier Motor Co. of New York, Inc., 47th
St. and 11th Ave., New York City.

AUTO SAVE 50-90% PARTS FOR 400 CARS

POPE, PACKARDS, PIERCE, BUICK,
STEVENS-DURYEA, KNOX, OVER-
LAND, ETC.

Motors,	\$25.00 up	Presto Tanks,	\$4.50 up
Magnetos,	4.00 up	New Spotlights,	2.00 up
Carburetors,	8.00 up	Generators,	10.00 up
Rear Axles,	15.00 up	Gears,	1.00 up
Front Axles,	5.00 up	Bearings,	1.00 up
Cylinders,	5.00 up	Radiators,	10.00 up

\$12 Diamond Bumpers.....\$5.50

Jobbers in Bankrupt Auto Supplies.

BRIGHTMAN AUTO EXCHANGE

321 Windsor Ave., Hartford, Conn.

SALESMEN AND DEALERS—A million
Ford owners are waiting for you to
show them the only safety steering at-
tachment; takes that jerk out of the
Ford steering wheel and makes it steer
like a Packard; pays for itself in tire
saving; put it on your car and dozens
want it; if you have small capital and
can put canvassers out to sell the own-
ers, selling yourself to the trade, you
can make a small fortune. Write to-
day. Saxton Auto Accessory Co., Inc.,
347 Fifth Ave., New York City.

—CLASSIFIED ADVERTISING PAYS—

Advertise the bargains that you have
to offer.

8000 Buyers Read MOTOR TRUCK.

(When Writing to Advertisers, Please Mention the Automobile Journal.)

TRADE OUTLET

At 304
**Columbus Ave.
For K-E-E-P-S**
304

Selling Slightly Used Tires. The Largest Stock in the East. "Your Money's Worth or We Make Good." Remember Our Prices Will Interest You.

Size	Tires	Size	Tires
30x3	\$4.50 down to \$2.40	33x4½	\$12.00 down to \$6.00
30x3½	6.50 down to 3.40	33x5	14.50 down to 8.00
32x3½	8.75 down to 3.90	35x4	10.50 down to 9.00
31x4	8.00 down to 4.00	34x4½	10.00 down to 6.00
32x4	8.25 down to 5.00	35x4½	12.00 down to 6.50
33x4	9.00 down to 5.50	36x4½	12.00 down to 6.00
34x4	10.75 down to 6.00	35x5	25.00 down to 6.90
32x4½	12.00 down to 7.00	36x5	12.00 down to 8.00
		37x5	14.00 down to 6.00

USED TUBES, ALL SIZES, AT \$1.50 TO \$2

MAIL ORDERS given prompt attention. Tires sent C. O. D. with privilege of examination. 5% discount if cash or money order comes with order.

BOSTON AUTO TIRE EXCHANGE
304 COLUMBUS AVE. TEL. B. B. 7329

Magneto and Generator Exchange of N. E.

44 COLUMBUS AVENUE, BOSTON, MASS.

SAVE 50%

Offers——

Quality Service for your car.

Starting, Lighting, Ignition.

One year guarantee on repairs and installations of all makes.

Everything pertaining to Auto, Electricity, Magneto and Generator Parts. We have one of the best equipped shops in New England devoted exclusively to this work.

BOSCH, SPLITDORF, EISEMANN, DIXIE, BERLING MAGNETOS
and Parts Always in Stock.



Magneto Repairs

Skillfully Done. Assured Satisfaction. Prompt Service.

The repair work turned out of this shop is of the highest merit—because I know how. If you have electrical and magneto troubles, no matter whether it is a

BOSCH, SPLITDORF-EISEMANN, or any other make, I can fix them. My well-appointed plant, coupled with skilled workmen, assures you of expert magneto service. Send in your magneto. 24-hour shipment.

Rebuilt Magnetos, Platinum Parts, Generator Brushes, Bearings, Etc.

Correspondence Invited.

The Magneto Shop

JOHN BRUNSWICK,

187 Massachusetts Ave., Boston, Mass.



SPECIALTIES for the Ford

They stop the rattle in—

The Brake Rod Supports for 35c.

The Brake Rod Clevises for 50c.

The Spark and Throttle Rods for 25c.

The Steering Splines for 50c.

They serve many other useful purposes and are

inexpensive.

JOBBER, DEALERS, write for prices and folder which mean money for you.

Affa Specialty Co., 34-D Southbridge St., Worcester, Mass.



BOSTON'S Finest Equipped Auto Electric Repair Service

With a staff of trained electrical men we can offer auto owners expert service, coupled with promptness and personal attention to all electrical repair problems. We also repair any electrical equipment used on a motor car. Official service and parts representative for

AUTO-LITE LIGHTING AND STARTING SYSTEMS.
Complete Stock of GENUINE PARTS.

All Work and Parts Guaranteed.

William H. Flaherty Co.

74 CUMMINGTON ST., BOSTON, MASS.

Tires Guaranteed 5000 Miles

30x3 plain.....	\$8.00
Non-Skid	\$10.00
30x3½ plain.....	\$11.00
Non-Skid	\$13.50

Big saving on other sizes and tubes also. Trade in your old tires. 20% deposit required on C. O. D. orders.

Write for lists to

M. Liben & Co.

793 J 7th Ave., New York City.



Front Absorber

Champion Shock Absorber Sales Co., Inc., Indianapolis, Ind., Mfs.

FOR FORD CARS. "Champion" Shock Absorbers. The perfect spring suspension. Absorbs all jar and rebound. Easy to attach. Fully guaranteed. Makes Fords ride as easy as any \$5000 car. Ford dealers, agents and owners, this ad is worth \$10 to you. Ask why. Write today.

JACKSON PARTS ALL YEARS and MODELS

Prompt and Satisfactory Service Guaranteed.

Jackson Motor Service Co.
Brighton District, Boston, Mass.

(When Writing to Advertisers, Please Mention the Automobile Journal.)



Syra-Cord TIRES

Distributors and Dealers!

Here is a cord tire with a universal tread, built by cord tire specialists in a factory where the only tires manufactured are cord tires.

The policy of the manufacturers is to specialize on cord tires, and by continual research and exhaustive road tests, make SYRA-CORD TIRES the leaders in the cord tire field.

There is nothing freaky about SYRA-CORD construction—it is a perfectly balanced cord tire, built of the best materials by experienced cord tire builders, under the direction of cord tire specialists.

Careful and prolonged tests have proved it to be a cord tire in a class by itself for mileage, for comfortable riding and for easy steering.

Exclusive territory is open only to those distributors and dealers who are prepared to handle such a proposition in a big way; for they will receive big co-operation.

Write today for full Particulars

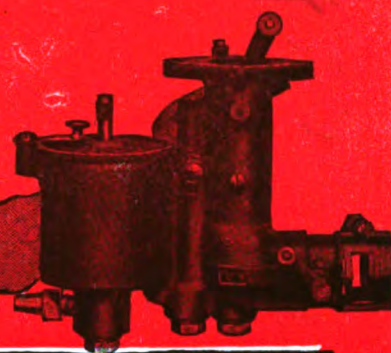
SYRACUSE RUBBER COMPANY, Inc.
SYRACUSE, NEW YORK

"Built By Cord Tire Specialists."

(When Writing to Advertisers, Please Mention the Automobile Journal.)

ZENITH

CARBURETOR



SUPREME IN EUROPE

*The "Autocar", London
November 1st., Shows:—*

That of the English, French, Italian, Belgian and Swiss motor cars represented on the English market, using carburetors built by specialists, 80 builders of 121 models use Zenith Carburetors as standard equipment. These percentages tell a convincing story:—

	Manufacturers	Models
ZENITH	71.4%	73.0%
Nearest competitor	11.6%	9.6%
Next nearest	6.3%	5.4%
9 other carburetors	10.7%	12.0%

At the Olympia, 1919

Of the one hundred and thirty-one makes of motor cars exhibited, fifty-two per cent were Zenith-equipped.

At Salon de Paris, 1919

Sixty-four per cent of all motors and sixty per cent of all cars exhibited were Zenith-equipped.

These facts prove the Zenith to be the foremost carburetor of Europe. Already more than one hundred American manufacturers of motor cars and trucks have adopted Zenith. There are in the United States and Canada over two hundred Service Stations where the individual car or truck owner can obtain Zenith Carburetors and Zenith service. A list of Service Stations and descriptive literature will be sent on request.

THE ZENITH CARBURETOR COMPANY

New York

DETROIT

Chicago

European Factories: Lyons, France

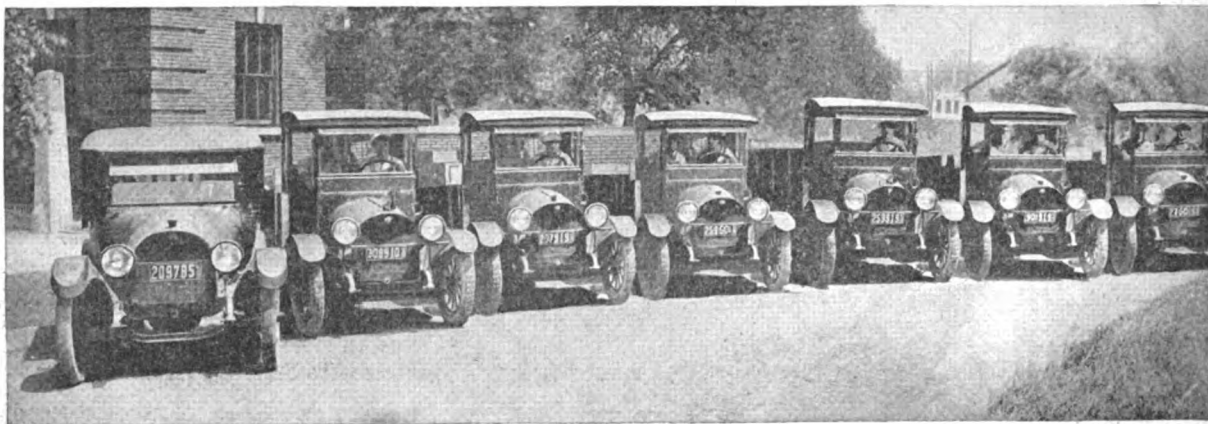
London, Eng.

Turin, Italy



RFH

REO



TELEPHONE 4000

CITY OF EVANSTON

DEPARTMENT OF STREETS
EVANSTON, ILLINOIS

ROBERT M. BROWN
COMMISSIONER

July 15th, 1919.

Our Street Department has in service five two ton, Model "J" Reo trucks and one Model "S" Reo Roadster.

The two trucks first purchased, equipped with Lee automatic side dump three yard steel bodies entered service April 2^d, 1918. One of these was wrecked August 8th, 1918 and replaced August 24th, 1918.

On July 26th, 1918, our Special Garbage Truck entered service, equipped with a wooden body designed to carry 120 garbage cans of one cubic foot each.

On March 26th and April 9th, 1919 two more trucks entered service. These are equipped with three yard Woods' hydraulic hoist rear dump steel bodies.

The roadster entered service May 14th, 1918.

These trucks have hauled crushed stone, sand, cinders, coal, ashes, rubbish and garbage continuously over paved and unpaved streets and alleys in all kinds of weather.

The consumption of gas and oil has been low, the repairs small and I consider the results remarkably good.

I am told the Model "F" truck, in service from March 26th, 1919, equipped with hand hoist rear dump steel body and operated by the Sewer Department is giving equally good results.

Robert M. Brown

Commissioner of Streets

" THE GOLD STANDARD OF VALUES "

Reo Motor Car Company
Lansing, Michigan

AUTOMOBILE JOURNAL

INDEX TO CONTENTS

Published Monthly by the
AUTOMOBILE JOURNAL PUB. CO.
Times Building, Pawtucket, R. I.

WILLIAM H. BLACK.....Treasurer
DAVID O. BLACK.....Secretary

Branch Offices: New York City, Chicago, Detroit,
Boston, St. Louis, Cleveland.

SUBSCRIPTIONS:

United States and Mexico (Postage Paid) the year \$1.50
Canada\$2.50
Foreign Countries in Postal Union.....\$3.50
The Copy.....20 Cents

PARTIAL LIST OF CONTENTS

	Page
*Unprecedented Interest Manifested in National Shows.....	11
Big Aerial Exhibition at Chicago.....	19
*Radical Measures Are Necessary to Curb Recklessness.....	20
*New Features in Cars Displayed at 1920 Shows.....	21
*To Eliminate the Grade Crossing Menace....	28
*Causes of Engine Troubles and Their Remedies.....	29
*Sectional Views of Typical Automobile Power Plants.....	33
*Humorous Side of Motoring.....	36
Names and Models of Passenger Cars for 1920	37
Calendar of Coming Events.....	38
*Notes of the Trade and Industry.....	39
*Convenient and Attractive Neighborhood Garage.....	43
*Dame Fashion Defies Jack Frost, Mrs. A. Sherman Hitchcock.....	44
Automobile Associations.....	47
Troubles of Power Plant.....	52
*New Type of Chicago Motor Bus Has a Glass Enclosed Upper Deck.....	56
Mechanical Queries.....	57

*Indicates Article Is Illustrated.

AUTOMOBILE JOURNAL

INDEX TO ADVERTISERS

	Page
Atwater Kent Sales Co. of N. E.....	4
Barrett Co., The.....	57
Barrett Motor Starter Manufacturing Co., Inc.....	62
Boston Auto Tire Exchange.....	5
Boston Retread Tire Co.....	4
Brightman Auto Exchange.....	4
Broadway Tire Jobbers Co.....	4
Brown Spring Oiler Co.....	57
Coes Wrench Co.....	64
Connecticut Auto Parts Co., Inc.....	4
Cotton Motor Co.....	59
Culver-Stearns Manufacturing Co.....	62
Dixon Crucible Co., Joseph.....	64
Eagle Oil and Supply Co.....	10
Flaherty, Wm. H. Co.....	5
Gastine Co.....	59
Grant Motor Car Co.....	Insert
Gulf Refining Co.....	1
Hotel Wellington.....	62
India Tire & Rubber Co.....	Cover
Jackson Motor Service Co.....	5
Lawson Co., F. H.....	59
Liberty Tire Co.....	4
Madison Tire & Rubber Co.....	Cover
Magneto and Generator Exchange of N. E.....	5
Magneto Shop.....	5
Metz Sales Corporation.....	57
National Automobile Show.....	61
National Can Co.....	63
National Motor Car & Vehicle Co.....	Cover
New Departure Manufacturing Co.....	64
New York and New Jersey Lubricant Co.....	63
Nielson Co., V. A.....	60
Paige-Detroit Motor Car Co.....	23
Pierce-Arrow Motor Car Co.....	Cover
Reo Motor Car Co.....	8
Standard Oil Co. of N. Y.....	58
Strandway Auto Parts Co.....	4
Syracuse Rubber Co., Inc.....	Cover
Wellington Hotel.....	62
Zenith Carburetor Co.....	7



**EAGLEINE
MOTOR OILS**

**EAGLEINE
GEAR OILS**

ELIMINATES ALL DOUBT

Eagleine trade marked products represent the highest quality lubricants that can be made.

Eagleine Motor Oils do not soot and they carbonize less than any other oil. Increases mileage on a given amount, protects against undue wear and saves in repair and upkeep costs.

Adds power to the engine and affords from 10,000 to 20,000 miles service without any engine trouble. A record common among Eagleine users.

Eagleine Oil is the cheapest oil to buy. It is the most economical in use. It lubricates to the last drop.

There is a grade for every motor and of a quality that will meet every need.

For constant, dependable and satisfactory service, start using Eagleine Motor Oil today.

Eagleine Gear Oil will eliminate most transmission and differential troubles. It lubricates to the last drop and lasts longer than grease. It cushions the gears and stops all undue wear. It will not solidify.

Eagleine products add to the service life of any car or truck. Vehicle insurance of the highest order.

Sold in sealed trade marked containers everywhere or direct.

EAGLE OIL AND SUPPLY COMPANY

4446 INDIA ST., BOSTON, MASS.

NEW YORK CITY,
Woolworth Building.

CHICAGO,
1132 W. 37th Street.

THE AUTOMOBILE JOURNAL

VOL. LXVII.

PAWUCKET, R. I., DECEMBER, 1919.

NO. 5.

Unprecedented Interest Manifested in National Shows

*New York and Chicago Events in
January Will Bring Out Bigger and
Better Exhibits Than Ever Before.*

THE fact that although the annual output of motor vehicles now in the United States reaches approximately 2,000,000, the absorptive power of the country is still far ahead of production, would seem to be partially explanatory of the unprecedented interest manifested in the big national automobile shows for 1920 in New York and Chicago by all the various activities concerned today in the making, marketing and equipment of all types of motor vehicles.

for years to come, constantly improving their models in every way, enlarging facilities and advancing methods of manufacture and distribution with the one idea of increasing the efficiency of their products and to add to their appeal to the motorist.

This year, for the first time, at a national show, will passenger cars and commercial motor vehicles be exhibited simultaneously, and the latter will be housed in a building by themselves amply commodious to allow the space and attention to be devoted to them that their phenomenally increasing utility in

the transportation field is demanding.

Date of New York Show.

The date for the New York show, which is the 20th event of the kind to be held in the Metropolis, is the week of Jan. 3-10, and the passenger cars will be shown in the Grand Central Palace, while the trucks will be exhibited at the same time in a location further up town, the Eighth Coast Artillery Armory.

The first organized exhibit of motor vehicles in New York was held in



Alfred Reeves, General Manager,
N. A. A. C.

Nothing is more significant of the sound readjustment of peace conditions than the universal desire to make the shows this year the largest and most representative since the establishment of these national automobile exhibitions. Manufacturers are on the alert to take the utmost advantage of the present era of prosperity in the automotive industry, but not satisfied with the present bright outlook they are wisely planning ahead



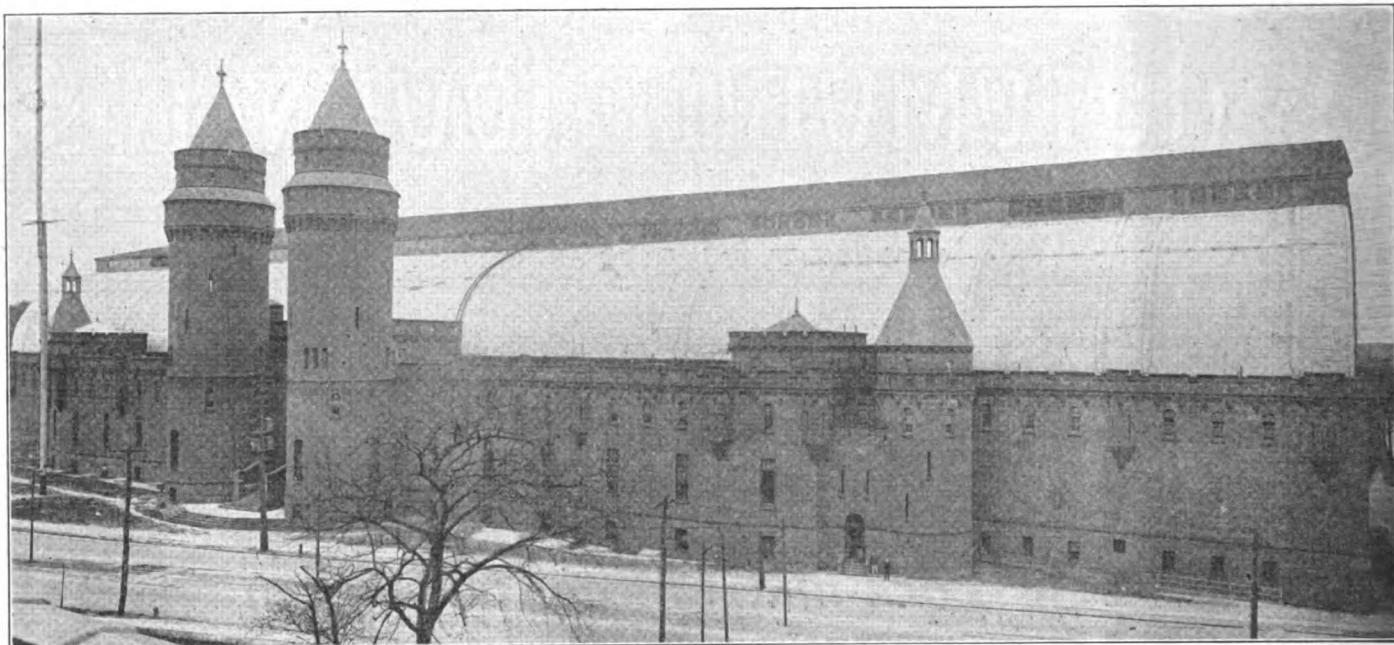
Grand Central Palace, Where Passenger Cars Will Be Shown in
New York City.



S. A. Miles, Manager National Au-
tomobile Shows.

1900 and was conducted by the Automobile Club of America. This show was the natural outcome of exhibitions which had been previously devoted to bicycles and vehicles of that type. In fact, at the bicycle show of 1899 automobiles proved a unique side attraction.

When the old Automobile Club of America was succeeded by the Association of Licensed Automobile Manufacturers, that



Eighth Coast Artillery Armory Where Commercial Cars Will Be Exhibited in New York, Jan. 3-10.

organization took over the annual shows. The Licensed Manufacturers' association was in turn succeeded by the Automobile Board of Trade, which developed into the present powerful and representative body known as the National Chamber of Commerce, which has sanctioned and arranged these events since its formation with the exception of those of the season of 1919.

The early shows were held in the Madison Square Garden and were in two periods, the first week being devoted to pleasure cars, and the second, held in the same place, to commercial vehicles, motorcycles being combined with the pleasure car section and accessories distributed between both shows.

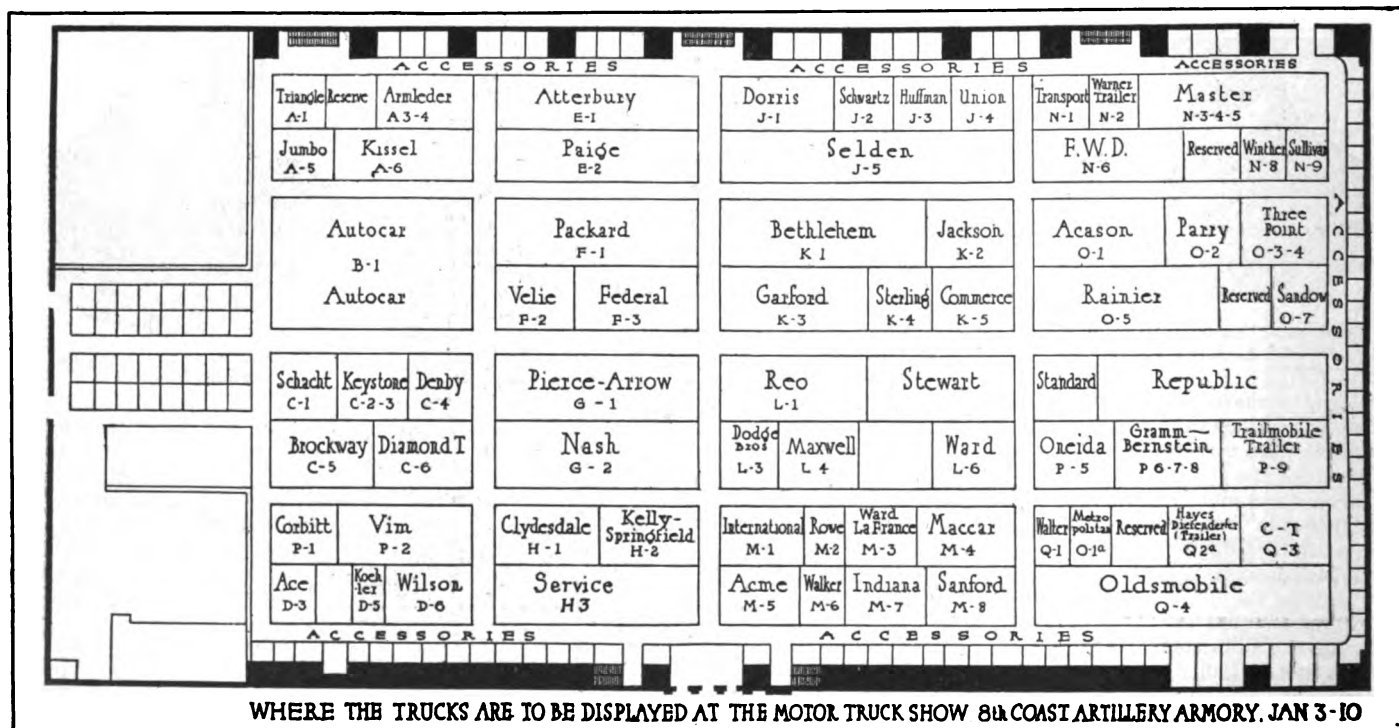
For a time there were two independent

shows both at the same time; one, which had the sanction of the Association of Licensed Automobile Manufacturers, being held in Madison Square Garden. The other, which was in a sense an overflow of the Garden show, was presented in Grand Central Palace, but under different management and under the auspices of the American Motor Car Manufacturers' Association. The latter organization disbanded in the spring of 1910, as most of its members had affiliated with the Association of Licensed Automobile Manufacturers, but the Central Palace show was held the following season under the supervision of the American Motor Car Manufacturers' Exhibit Association. During the progress of this display the National Association of Motor Car Manufacturers was brought into being and fu-

ture international exhibitions were seemingly assured by the taking of an option by the new association on Grand Central Palace for a series of years. This show was by no means at that time confined to automobiles, as a number of aeroplanes and aviation accessories shared with the motor cars the attention of visitors.

Features of Later Exhibits.

In 1912 the exhibits in both the Madison Square Garden and Grand Central Palace were combined under one management, S. A. Miles staging both events. In 1913 both shows were under the auspices of the Automobile Board of Trade, which had succeeded the licensed association. This show was held in two periods of one week each, the first being devoted to pleasure cars and the second to commercial vehicles. Manufacturers



WHERE THE TRUCKS ARE TO BE DISPLAYED AT THE MOTOR TRUCK SHOW 8th COAST ARTILLERY ARMORY, JAN 3-10

of accessories made display both weeks, and in addition members of the National Machine Tool Builders' Association exhibited during the second week.

In 1914 the show was held in the Grand Central Palace alone and it was housed subsequently in that place until 1919, when that building had been taken over for war service, and the show went back to the Madison Square Garden. In 1915, as all foreign shows were omitted, the American events were of especial interest and this was shown in the fact that this display, as well as those in the two years following, were increasingly successful.

A Patriotic Display.

The 1918 display was the first one held while the country was at war, and it took on a decidedly patriotic aspect. At this time the majority of the exhibitors met the demand for the utility and serviceability of the motor car for transporting passengers, rather than as a purely pleasure proposition. There were seen none of the freakish or extreme type of bodies that had characterized previous exhibits.

In 1919 the National Chamber of Commerce recommended that no show be

held, as the conditions were not deemed favorable for its success, but the New York Automobile Dealers' Association took the matter up and made plans for staging an exhibition independently.

It was decided to hold the event in two divisions, one going to the old quarters in the Madison Square Garden and the second division in the 69th Regiment Armory, the Palace not being available. The original design was to have passen-

ger cars shown in both buildings and the trucks in Madison Square Garden. It was finally decided that during the first week passenger cars and accessories should be held in both buildings, but that during the second or truck week, commercial vehicles be shown at the Garden and Armory and accessories only at the Garden.

The last truck show sanctioned by the National Chamber of Commerce was held

To Go to Truck Show

FROM

Grand Central Palace
Grand Central Station
Biltmore Hotel
Belmont Hotel
Commodore Hotel
Manhattan Hotel
Murray Hill Hotel
Ritz-Carlton Hotel

TAKE

Lexington Avenue Subway Marked Jerome Avenue. Entrances Are on Lexington Avenue, Immediately South of 43rd Street and Immediately North of 42nd Street. Time About 30 Minutes.

FROM

Pennsylvania Station
Pennsylvania Hotel
McAlpin Hotel
Imperial Hotel
Waldorf-Astoria

TAKE

Sixth Avenue Elevated at 33rd Street. Time About 40 Minutes.

FROM

Astor Hotel
Claridge Hotel
Knickerbocker Hotel

TAKE

Sixth Avenue Elevated at 42nd Street, or Broadway-Seventh Avenue Subway at Times Square. Take Subway Train Market West Farms and Change at Mott Avenue to Jerome Avenue Line.

FROM

Any Point Between Fifth Avenue and the East River

TAKE

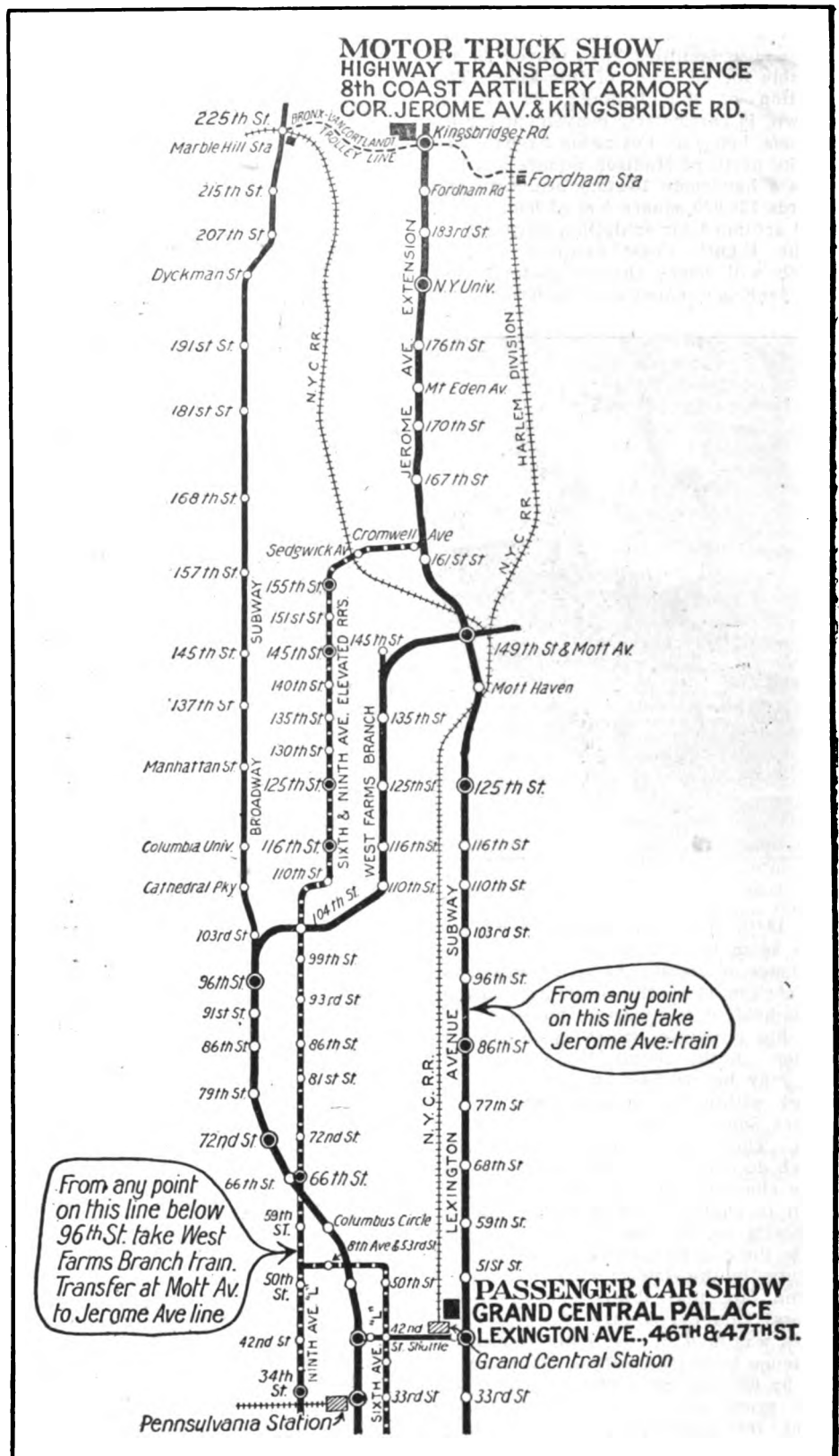
Nearest Station on Lexington Avenue Subway, Which, South of 42nd Street, Runs Under Fourth Avenue. Take or Change to Express Marked Jerome Avenue.

FROM

All Points on the West Side

TAKE

Sixth or Ninth Avenue Elevated, or Broadway-Seventh Avenue Subway. Take Subway Train Marked West Farms and Change at Mott Avenue to Jerome Avenue Line.



Map Showing Location of Eighth Coast Artillery Armory and Grand Central Palace, Together with Connecting Rapid Transit Lines.

in 1913, since which time no commercial car exhibit had been held under its auspices. Last year trucks were shown and proved a very successful feature. This year the truck seems to finally have come into its own, as the commercial section is to exhibit coincidentally with the pleasure cars and under conditions which adequately recognize it as the important branch of the industry it has become.

Exhibits This Year.

The pleasure car division will exhibit this year again in the Grand Central Palace, whose facilities have proved so admirable for an event of this kind. The location of this building, as is well known, is particularly convenient for its patrons, being on Lexington avenue, two blocks north of Madison Square Garden. It is a handsome 13-story structure and affords 120,000 square feet of floor space, well arranged for exhibition purposes.

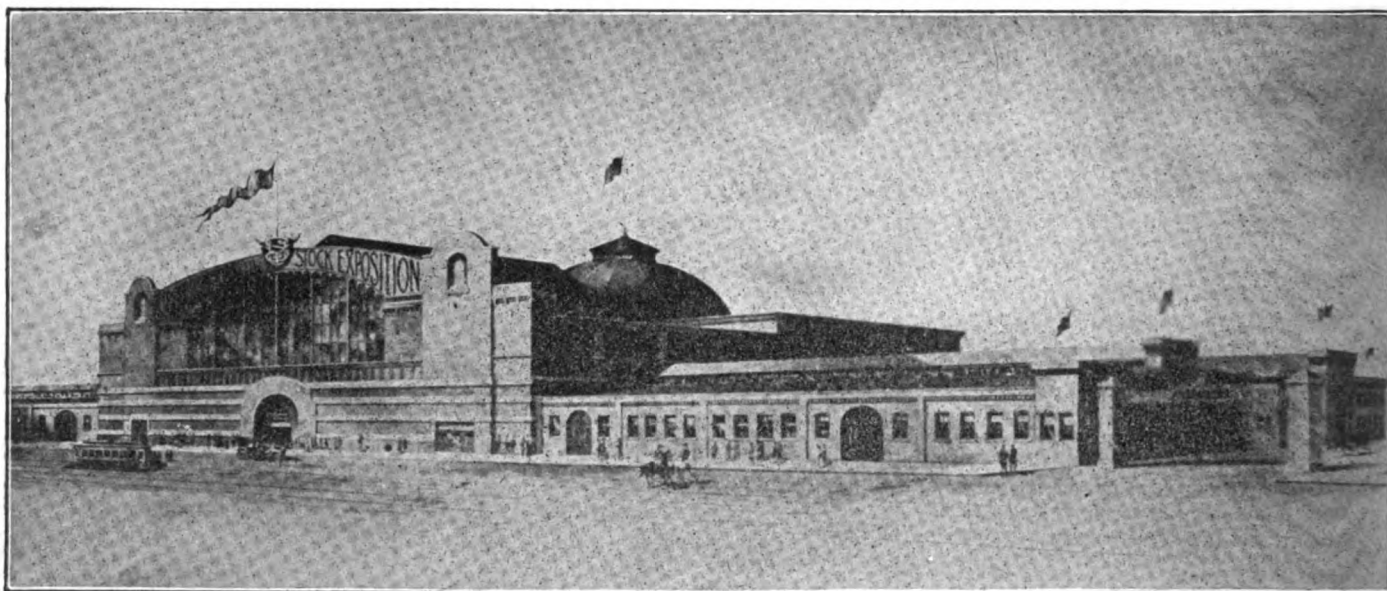
The Eighth Coast Artillery Armory, which will house the commercial cars this year, is situated at Kingsbridge road

Exhibitors at New York and Chicago Automobile Shows

LIST OF PASSENGER CARS.

NOTE—All exhibitors will appear in both shows unless otherwise noted. Exhibitors marked "C," will enter Chicago show only. Exhibitors marked "N. Y.," will enter New York show only.

Name	Company	Address
Allen	Allen Motor Co.	Columbus, O.
American Beauty	Pan-American Motors Corps.	Decatur, Ill.
Anderson	Anderson Motor Co.	Rock Hill, S. C.
Apperson	Apperson Bros. Auto Co.	Kokomo, Ind.
Auburn	Auburn Automobile Co.	Auburn Ind.
Biddle	Biddle Motor Car Co., Inc.	Philadelphia, Pa.
Briscoe	Briscoe Motor Corp.	Jackson, Mich.
Buick	Buick Motor Co.	Flint, Mich.
Cadillac	Cadillac Motor Car Co.	Detroit, Mich.
Case	J. I. Case T. M. Co.	Racine, Wis.
Chalmers	Chalmers Motor Co.	Detroit, Mich.
Chandler	Chandler Motor Car Co.	Cleveland, O.
Chevrolet	Chevrolet Motor Co.	New York, N. Y.
Cleveland	Cleveland Automobile Co.	Cleveland, O.
Cole	Cole Motor Car Co.	Indianapolis, Ind.
Columbia	Columbia Motors Co.	Detroit, Mich.



National Amphitheater at Chicago, Where the Trucks Will Be Shown This Year.

and 194th street, and while its location may seem to be somewhat of an inconvenience on account of its distance from the section where the shows have always been held, it is reported, however, that the big structure, which is the largest armory in the country, is easy to find and may be reached by subway or elevated within 35 minutes from either Times Square or the Grand Central station. There are several possible routes, which do not involve more than the possible changing from one "L" or subway train to another, and Manager Miles is authority for the statement that he has made the trip frequently in less than 40 minutes by the slowest way.

The fact that the armory combines several valuable features for show purposes was held to counteract any inconvenience from its location. It measures 300 by 600 feet clear of pillars or posts. The great drill floor affords 150,000 square feet of unbroken floor space under one gigantic vaulted roof, while a large auditorium, seating between 7000 and 8000 people, will be available for the

Comet	Comet Automobile Co.	Decatur, Ill.
Commonwealth	Commonwealth Motors Co.	Chicago, Ill.
Crow-Elkhart	Crow-Elkhart Motor Co.	Elkhart, Ind.
Davis	Geo. W. Davis Motor Car Co.	Richmond, Ind.
Detroit Electric	Anderson Electric Car Co.	Detroit, Mich.
Dixie Flyer	Kentucky Wagon Mfg. Co.	Louisville, Ky.
Dodge Bros.	Dodge Bros.	Detroit, Mich.
Dorris	Dorris Motor Car Co.	St. Louis, Mo.
Dort	Dort Motor Car Co.	Flint, Mich.
Elcar	Elkhart Carriage & Motor Car Co.	Elkhart, Ind.
Elgin	Elgin Motor Car Co.	Chicago, Ill.
Fiat	F. I. A. T.	New York City.
Franklin	H. H. Franklin Mfg. Co.	Syracuse, N. Y.
Grant	Grant Motor Car Corp.	Cleveland, O.
Haynes	Haynes Automobile Co.	Kokomo, Ind.
Hollier	Lewis Spring & Axle Co.	Chelsea, Mich.
Holmes	Holmes Automobile Co.	Canton, O.
Hudson	Hudson Motor Car Co.	Detroit, Mich.
Hupmobile	Hupp Motor Car Corp.	Detroit, Mich.
Jackson	Jackson Automobile Co.	Jackson, Mich.
Jordan	Jordan Motor Car Co.	Cleveland, O.
King	King Motor Car Co.	Detroit, Mich.
Kissel Kar.	Kissel Motor Car Co.	Hartford, Wis.
Kline Kar (N. Y.)	Kline Car Corp.	Richmond, Va.

Name	Company	Address
Leach (C).....	Leach-Biltwell Co.....	Los Angeles, Cal.
Lexington.....	Lexington Motor Co.....	Connersville, Ind.
Liberty.....	Liberty Motor Car Co.....	Detroit, Mich.

McFarlan.....	McFarlan Motor Co.....	Connersville, Ind.
Maibohm.....	Maibohm Motors Co.....	Sandusky, O.
Marmon.....	Nordyke & Marmon Co.....	Indianapolis, Ind.
Maxwell.....	Maxwell Motor Co.....	Detroit, Mich.
Mercer.....	Mercer Automobile Co.....	Trenton, N. J.
Metz.....	Metz Co.....	Waltham, Mass.
Milburn Electric.....	Milburn Wagon Co.....	Toledo, O.
Mitchell.....	Mitchell Motors Co.....	Racine, Wis.
Monitor.....	Monitor Motor Car Co.....	Columbus, O.
Monroe (C).....	William Small Co.....	Indianapolis, Ind.
Moon.....	Moon Motor Car Co.....	St. Louis, Mo.

Nash.....	Nash Motors Co.....	Kenosha, Wis.
National.....	Natl. Motor Car & Vehicle Corp.....	Indianapolis, Ind.

Oakland.....	Oakland Motor Car Co.....	Pontiac, Mich.
Oldsmobile.....	Olds Motor Works.....	Lansing, Mich.
Olympian.....	Olympian Motors Co.....	Pontiac, Mich.
Overland.....	Willys-Overland Co.....	Toledo, O.
Owen-Magnetic.....	Baker R. & L. Co.....	Cleveland, O.

Packard.....	Packard Motor Car Co.....	Detroit, Mich.
Paige.....	Paige-Detroit Motor Car Co.....	Detroit, Mich.
Paterson.....	W. A. Paterson Co.....	Flint, Mich.
Peerless.....	Peerless Motor Car Co.....	Cleveland, O.
Pierce-Arrow.....	Pierce-Arrow Motor Car Co.....	Buffalo, N. Y.
Pilot (C).....	Pilot Motor Car Co.....	Richmond, Ind.
Premier.....	Premier Motor Corp.....	Indianapolis, Ind.

Reo.....	Reo Motor Car Co.....	Lansing, Mich.
Roamer.....	Barley Motor Car Co.....	Kalamazoo, Mich.
R & V-Knight.....	Root & Van Dervoort Eng. Co.....	East Moline, Ill.

Saxon.....	Saxon Motor Car Corp.....	Detroit, Mich.
Sayers.....	Sayers & Scovill Co.....	Cincinnati, O.
Scripps-Booth.....	Scripps-Booth Corp.....	Detroit, Mich.
Standard.....	Standard Steel Car Co.....	Pittsburgh, Pa.
Stanley.....	Stanley Motor Carriage Co.....	Newton, Mass.
Stearns-Knight.....	F. B. Stearns Co.....	Cleveland, O.
Stephens Six.....	Moline Plow Co., Motor Branch.....	Moline, Ill.
Stevens-Duryea.....	Stevens-Duryea Co.....	Chicopee Falls, Mass.
Studebaker.....	Studebaker Corp.....	South Bend, Ind.
Stutz.....	Stutz Motor Co.....	Indianapolis, Ind.

Templar.....	Templar Motor Corp.....	Cleveland, O.
--------------	-------------------------	---------------

Velle.....	Velle Motors Corp.....	Moline, Ill.
------------	------------------------	--------------

Westcott.....	Westcott Motor Car Co.....	Springfield, O.
Willys-Knight.....	Willys-Overland Co.....	Toledo, O.
Winton.....	Winton Co.....	Cleveland, O.

LIST OF MOTOR TRUCK EXHIBITORS.

Acason.....	Acason Motor Truck Co.....	Detroit, Mich.
Acme.....	Acme Motor Truck Co.....	Cadillac, Mich.
All-American (C).....	All-American Truck Co.....	Chicago, Ill.
Ace.....	American Motor Truck Co.....	Newark, O.
Armleder (C).....	The O. Armleder Co.....	Cincinnati, O.
Armleder (N. Y.).....	Armleder Sales & Service Co.....	New York City.
Atterbury.....	Atterbury Motor Car Co.....	Buffalo, N. Y.
Autocar.....	Autocar Co.....	Ardmore, Pa.

Bethlehem.....	Bethlehem Motors Corp.....	Allentown, Pa.
Brockway (N. Y.).....	Brockway Motor Truck Co.....	Cortland, N. Y.

Clydesdale.....	Clyde Cars Co.....	Clyde, O.
Commerce (N. Y.).....	Commerce Motor Car Co.....	Detroit, Mich.
Corbitt (N. Y.).....	Corbitt Motor Truck Co.....	Henderson, N. C.
C. T. (N. Y.).....	Commercial Truck Co. of America.....	Philadelphia, Pa.

Defiance.....	Turnbull Motor Truck & Wagon Co.....	Defiance, O.
Denby.....	Denby Motor Truck Co.....	Detroit, Mich.
Dependable (C).....	Dependable Truck & Tractor.....	Galesburg, Ill.
Diamond T.....	Diamond T Motor Car Co.....	Chicago, Ill.
Dodge Brothers.....	Dodge Brothers.....	Detroit, Mich.
Dorris.....	Dorris Motor Car Co.....	St. Louis, Mo.

Federal.....	Federal Motor Truck Co.....	Detroit, Mich.
F. W. D. (N. Y.).....	Four Wheel Drive Motor Truck.....	Webberville, Mich.

Garford.....	Garford Motor Truck Co.....	Lima, O.
Gary (C).....	Gary Motor Truck Co.....	Gary, Ind.
Gramm-Bernstein.....	Gramm-Bernstein Motor Truck.....	Lima, O.

Hendrickson (C).....	Hendrickson Motor Truck Co.....	Chicago, Ill.
Huffman.....	Huffman Bros. Motor Co.....	Elkhart, Ind.

Indiana.....	Indiana Truck Corp.....	Marion, Ind.
International.....	International Harvester Corp.....	Chicago, Ill.

sessions of the transportation convention it is proposed to hold during the week of the show. Provision is also made for a suitable restaurant. Here for the first time in the history of these events will the commercial car interests have all the room needed for an adequate exposition of its utilities. The pleasure car section will incidentally have more commodious facilities for the exposition of its exclusive features.

The plan of holding both sections of the show simultaneously will result in the bringing to the show cities more representatives of the automotive industry during one period than ever before. Heretofore, dealers and out-of-town visitors have been compelled to make their rounds of the expositions cover two periods and in many cases, dealers found that other business interests made it impracticable for them to spare more than one week at the show centers. Under the arrangements prevailing at this show it will be possible to inspect the latest passenger cars and truck models, as well as accessories, during the same week.

Some Comparison of Exhibits.

While it would obviously be illogical to compare with previous events the number of exhibits made at last year's show, on account of the changed conditions under which it was held at that time, some statistics of events staged

EXHIBITORS AT NEW YORK SHOWS.

83 Passenger Cars.
65 Trucks.
2 Trailers.
2 Bodies.
267 Accessories.

during the pre-war period as showing the rapid progress of the industry may be of interest. At the first show at Madison Square Garden in 1900 there were only 31 exhibitors of motor cars and motorcycles and 20 of accessories. And at that show, strange as it may seem in the light of present day exhibits, steam cars easily were in predominance, with a goodly number of electrics, while gasoline cars were a bad third. In 1912 it was reported that 250 cars were shown by 70 different exhibitors; in 1915, 528 cars were shown by 81 manufacturers, there being six electrics and 249 motorcycle and accessory exhibitors. In 1917 there were 97 car exhibitors, 342 cars and chassis being shown, and 226 accessory displays; in 1918 some 400 cars were displayed by 86 American exhibitors.

This year Samuel A. Miles rounds out a score of years efficient management of the national shows at Chicago, and has directed every one in New York during that time with the exception of 1919, when the show was staged by a different organization. The knowledge that Mr. Miles has the management of all shows again this year is sufficient indorsement that both general arrangements and minutest details will be looked after with the same care and efficiency that have

characterized the exhibitions in the past. Mr. Miles has arranged with John R. Eustis to serve as his assistant, and Mr. Eustis will have especial charge of the truck division and conference.

Truck Conference.

Plans for the Highway Transport conferences, which is to be held in conjunction with the national truck shows, indicate that they will be the most comprehensive and important yet held. The feature of these sessions will be the liberal use of illustrations both by stereoptican slides and moving picture films. The conference will be opened the evening of Jan. 3 at New York. The matters of highways and highway traffic, motor express operation and farmers' haulage problems will be among those discussed, together with subjects having to do with the actual operation of motor trucks.

During the remaining six days of the shows the afternoon sessions will be especially devoted to the interests of those engaged in the motor truck business from the standpoint of manufacturing, distribution and service, and at the evening sessions topics of particular import to truck owners and operators and shippers and others interested in transportation will be presented. However, all sessions will be open to the general public. On the closing day there will be a single joint session in the afternoon.

Bus Service to Truck Show.

Because of the distance between the Grand Central Palace and the Eighth Coast Artillery Armory in the Bronx, which will house the motor truck show, motor bus passenger lines will be operated between the two points for the convenience of visitors.

Price of Admission Increased.

It has been decided that to meet the increased expense of running the show this year it is necessary to raise the admission price. For the passenger car exhibit the entrance fee has been increased to 75 cents, including war tax. The price for the truck show will be 55 cents, inclusive of war tax.

Automobile Makers to Dine.

One social feature that is usually anticipated during the course of the New York displays is the annual banquet of the National Automobile Chamber of Commerce. This will be held this year the evening of Tuesday, Jan. 6, in the grand ball room of the Commodore hotel. Besides the customary single speaker there will be other interesting features this year, including the presentation of awards to individuals who have rendered important service to the industry during the past 12 months, and the production of an original play on timely topics in the industry written by Fred E. Dayton, vice president of the Ajax Rubber Co., and Henry Caldwell, automobile editor of the New York Herald.

With the additional accommodations that the ball room provides, it will be possible to care for a number of men connected with the automotive industry, aside from those who are affiliated with the National Automobile Chamber of Commerce. Balcony seats will be provided for ladies who wish to attend.

Name	Company	Address
Jackson	Jackson Automobile Co.....	Jackson, Mich.
Jumbo	Nelson Motor Truck Co.....	Saginaw, Mich.
Kalamazoo (C).....	Kalamazoo Motors Corp.....	Kalamazoo, Mich.
Kelly (N. Y.).....	Kelly & Springfield Motor Truck.....	Springfield, O.
Keystone (N. Y.).....	Commercial Car Unit Co.....	Philadelphia, Pa.
Kissel	Kissel Motor Car Co.....	Hartford, Wis.
Koehler (N. Y.).....	H. J. Koehler Motors Corp.....	Newark, N. J.
Maccar	Maccar Truck Co.....	Scranton, Pa.
Master	Master Trucks, Inc.....	Chicago, Ill.
Maxwell	Maxwell Motor Co.....	Detroit, Mich.
Nash	Nash Motors Co.....	Kenosha, Wis.
Obenchain-Boyer (C)...	Obenchain-Boyer Co.....	Logansport, Ind.
Oldsmobile	Olds Motor Works.....	Lansing, Mich.
Oneida	Oneida Motor Truck Co.....	Green Bay, Mich.
Packard	Packard Motor Car Co.....	Detroit, Mich.
Paige	Paige-Detroit Motor Car Co.....	Detroit, Mich.
Parker (C).....	Parker Motor Truck Co.....	Milwaukee, Wis.
Patriot (C).....	Hebb Motors Co.....	Lincoln, Neb.
Pierce-Arrow	Pierce-Arrow Motor Car Co.....	Buffalo, N. Y.
Rainier	Rainier Motor Corp.....	Flushing, L. I., N. Y.
Reo	Reo Motor Car Co.....	Lansing, Mich.
Republic	Republic Motor Truck Co.....	Alma, Mich.
Rowe (N. Y.).....	Rowe Motor Mfg. Co.....	Lancaster, Pa.
Sandow	Sandow Motor Truck Co.....	Chicago, Ill.
Sanford (N. Y.).....	Sanford Motor Truck Co.....	Syracuse, N. Y.
Schacht	G. A. Schacht Motor Truck Co.....	Cincinnati, O.
Schwartz (N. Y.).....	Schwartz Motor Truck Co.....	Reading, Pa.
Selden	Selden Motor Vehicle Co.....	Rochester, N. Y.
Service (C).....	Service Motor Truck Co.....	Wabash, Ind.
Standard	Standard Motor Truck Co.....	Detroit, Mich.
Sterling (N. Y.).....	Sterling Motor Truck Co.....	Milwaukee, Wis.
Stewart	Stewart Motor Corp.....	Buffalo, N. Y.
Sullivan (N. Y.).....	Sullivan Motor Truck Corp.....	Rochester, N. Y.
Trailmobile	Trailmobile Co.....	Cincinnati, O.
Transport	Transport Truck Co.....	Mt. Pleasant, Mich.
Three Point (N. Y.)...	Three Point Truck Co.....	Newark, N. J.
Triangle (N. Y.).....	Triangle Motor Truck Sales Co.....	381 4th Ave., N. Y. C.
Union	Union Motor Truck Co.....	Bay City, Mich.
Velle	Velle Motors Corp.....	Moline, Ill.
Vim	Vim Motor Truck Co.....	Philadelphia, Pa.
Walker	Walker Vehicle Co.....	Chicago, Ill.
Walter	Walter Motor Truck Co.....	Mt. Vernon, N. Y.
Ward (N. Y.).....	Ward Motor Vehicle Co.....	Mt. Vernon, N. Y.
Ward La France (N. Y.)	Ward La France Truck Co.....	Elmira, N. Y.
Wilson	J. C. Wilson Co.....	Detroit, Mich.
Winther	Winther Motor Truck Co.....	Kenosha, Wis.

Trailers on Floor with Truck Exhibits.

Fruehauf (C).....	Fruehauf Trailer Co.....	Detroit, Mich.
Highway Trailer (N. Y.)	Hayes-Diefenderfer Co., Inc.....	New York City.
Warner Trailer.....	Warner Mfg. Co.....	Beloit, Wis.

Bodies on Main Floor with Truck Exhibits.

Metropolitan Body Co., Inc. (N. Y.).....	Bridgeport, Conn.
Parry Mfg. Co.....	Indianapolis, Ind.

EXHIBITORS OF ACCESSORIES.

Name	Passenger N. Y. Chgo.	Truck N. Y. Chgo.
A. B. C. Mfg. Co., New York.....	*	*
Accurate System & Manifold Co., N. Y.....	*	*
Acme Auto Accessories Co., Chicago.....	*	*
Advance Auto. Accessories Corp., Chicago.....	*	*
Af-Ford-Able Sales Co. of N. Y., Inc., N. Y. City.....	*	*
Air Device Co., Chicago.....	*	*
Alemite Die Casting & Mfg. Co., Chicago.....	*	*
Alexander, J., Mfg. Co., New York.....	*	*
Aluminum Brazing Solder Co., Philadelphia, Pa.....	*	*
Aluminum Die Castings Co., Cleveland, O.....	*	*
American Auto Lamp Co., Inc., N. Y.....	*	*
American Auto. Digest, Cincinnati, O.....	*	*
American Bosch Magneto Corp., Springfield, Mass.....	*	*
American Bureau of Engineering, Chicago.....	*	*
American Chain Co., Inc., Bridgeport, Conn.....	*	*
American Ever Ready Works, L. I. City, N. Y.....	*	*
American Hammered Piston Ring Co., Baltimore.....	*	*
American Machine Co., Newark, Del.....	*	*
American Pump & Tank Co., New York.....	*	*
American Taximeter Co., New York.....	*	*
Ames Co., F. A., Owensboro, Ky.....	*	*
Anderson Electric Specialty Co., Chicago.....	*	*
Apollo Magneto Corp., Kingston, N. Y.....	*	*

Name	Passenger		Truck	
	N. Y.	Chgo.	N. Y.	Chgo.
Arc-o Mfg. Co., Inc., Chicago.....
Arnold Electric Tool Co., New York.....
Arrow Grip Mfg. Co., Glens Falls, N. Y.....
Asch & Co., Inc., New York.....
Au-To Compressor Co., Wilmington, O.....
Automatic Safety Tire Valve Corporation, N. Y.....
Automobile Journal Publishing Co., Pawtucket, R. I.....
Auto Pedal Pad Co., New York.....
Barnes Foundry Co., Jersey City, N. J.....
Barney's Auto Parts Co., New York.....
Bausch Machine Tool Co., Springfield, Mass.....
Bedker Brothers, Chicago.....
Bendus, J. V., New York.....
Benjamin Electric Mfg. Co., Chicago.....
Black & Decker Mfg. Co., Baltimore, Md.....
Blackledge John W., Mfg. Co., Chicago.....
Breeze Mfg. Co., Newark, N. J.....
Briscoe Devices Co., Jackson, Mich.....
Brown-Lipe-Chapin Co., Syracuse, N. Y.....
Brown-Lipe Gear Co., Syracuse, N. Y.....
Buda Co., Harvey, Ill.....
Budd, Edward G. Mfg. Co., Philadelphia, Pa.....
Budd Wheel Corp., Philadelphia, Pa.....
Buell Mfg. Co., Chicago, Ill.....
Byrne, Kingston & Co., Kokomo, Ind.....
Campbell, A. S. Co., Boston, Mass.....
Casco Mfg. Co., Thomasville, Ga.....
Challoner Co., Oshkosh, Wis.....
Champion Ignition Co., Flint, Mich.....
Chase, L. C. & Co., Boston, Mass.....
Chicago Steel Wheel Co., Chicago, Ill.....
Chilton Co., Philadelphia, Pa.....
Clark Equipment Co., Buchanan, Mich.....
Class Journal Co., New York City.....
Cleveland Heater Co., Cleveland, O.....
Coffield Tire Protector Co., Dayton, O.....
Columbia Axle Co., Cleveland, O.....
Commercial Investment Trust, N. Y.....
Connecticut Clock Co., N. Y.....
Continental Auto Parts Co., Columbus, Ind.....
Continental Motors Corp., Detroit, Mich.....
Corbin Screw Corp., New Britain, Conn.....
American Hardware Corp. Succ.....
Copp, George W. Co., New York.....
Corcoran Mfg. Co., Cincinnati, O.....
Corcoran-Victor Co., Cincinnati, O.....
Cowles, C. & Co., New Haven, Conn.....
Cramp, Wm. & Sons, Ship & Eng. Co., Philadelphia, Pa.....
Cronk, E. D. & A. F., Inc., Utica, N. Y.....
Curtis Pneumatic Machine Co., St. Louis, Mo.....
Dayton Steel Foundry Co., Dayton, O.....
Defender Auto Lock Co., Inc., Detroit, Mich.....
Detroit Carrier & Mfg. Co., Detroit, Mich.....
Detroit Pressed Steel Co., Detroit, Mich.....
Dewey, George W., New York City.....
Dixon, Jos., Crucible Co., Jersey City, N. J.....
Doehler Die Casting Co., Brooklyn, N. Y.....
Dorr Miller Differential Co., New York.....
Duff Mfg. Co., Pittsburgh, Pa.....
Dunham, Thomas Co., Aurora, Ill.....
Duplex Engine Governor Co., Brooklyn, N. Y.....
Detroit Steering Wheel Corp., Detroit, Mich.....
E. A. Laboratories, Inc., Brooklyn, N. Y.....
Eastern Machine Co., S. Easton, Mass.....
Eastern Rubber Co., Philadelphia, Pa.....
Eclipse Machine Co., Elmira, N. Y.....
Edelman & Co., E., Chicago, Ill.....
Eisemann Magneto Co., Brooklyn, N. Y.....
Electric Storage Battery Co., Philadelphia, Pa.....
Empire Axle Co., Dunkirk, N. Y.....
English & Mersick Co., New Haven, Conn.....
Ericsson Mfg. Co., Buffalo, N. Y.....
Essenkey Products Co., Chicago, Ill.....
Essex Rubber Co., Inc., Trenton, N. J.....
Everyday Eng. Magazine, New York.....
Fairbanks Co., New York.....
Faw, J. H., Inc., New York.....
Fire-Gun Mfg. Co., Inc., New York.....
Fleckenstein Visible Gasometer, Grand Rapids.....
Flint Motor Axle Co., Flint, Mich.....
Ford News Publishing Co., Long Island City.....
Franklin Mach. & Tool Co., Springfield, Mass.....
Fulton Co., Knoxville, Tenn.....
Gabriel Mfg. Co., Cleveland, O.....
Gastine Co., Bridgton, N. J.....
General Electric Co., Schenectady, N. Y.....
Gill Mfg. Co., Chicago, Ill.....
Globe Mfg. Co., Battle Creek, Mich.....
Gould Storage Battery Co., N. Y. C.....
Gray & Davis, Inc., Boston, Mass.....
Grundy Mfg. Corp., Detroit, Mich.....
Guarantee Visible Measure Sales Co., Washington, D. C.....

Features of Chicago Exhibition

Early in the history of the gasoline automobile Chicago began to play an important part in the development of the industry, and owing to its central location and its proximity to the biggest motor car manufacturing plants of the Middle West, the annual national show at this western metropolis has always had an importance apart from the big shows of the East. Dealers from the Central West, West, South and Northwest have always made the Chicago exhibition their point of rendezvous. The negotiations between manufacturers and dealers for the year's business are consummated here, and new contracts made and new agencies secured.

As the Chicago show follows the New York display it is of course to be expected that many of the exhibits should be similar to a certain extent to those at New York, but Manager Miles has always provided an entirely different environment and decorative scheme for the western event to meet the tastes of a different clientele which attends the western event. The exhibits in number and variety have always closely approximated and sometimes even surpassed those at New York, as might be expected from the fact that Chicago is nearer the heart of the manufacturing end of the automotive industry.

The Chicago show was held as a unit when the eastern show was divided and held under the auspices of two separate associations, and the advice and efforts of Manager Miles to preserve the unity of the Chicago show and make it representative of the entire industry have always been successful and the wisdom of this course has been recognized.

Where Chicago Events Are Housed.

The Coliseum and Annex, which have for so many years been the scene of these annual events, are still retained this year to house the passenger cars and accessories, and the First Regiment Armory, across the street from the Coliseum, will also be utilized as an overflow for this division. In 1916 the show became of such proportions that four buildings were needed and the Greer building, adjoining the Coliseum, was used for several years.

When plans were matured this year to hold the truck exhibition the same week as the passenger car show, it became apparent that larger accommodations than ever before would be needed to adequately house the commercial car division. This resulted in the leasing of the International Amphitheater for the exclusive showing of trucks and accessories. This building is located at Halsted and 42nd streets, and is the scene of the annual stock shows, the horse shows and other events of a similar nature for which Chicago has been famed for many years past. The International Amphitheater consists of a main arena and two wings. It is possible to obtain at this structure and its adjoining buildings as much space as at the armory, but excluding the

less desirable space, some 120,000 square feet will be utilized, and ample space is still available should conditions demand an overflow. The Amphitheater is readily reached by the elevated road from the center of the city in about 20 minutes, and there are ample transportation facilities from other parts of the city.

Date of Chicago Show.

This will be the 20th annual exhibition at Chicago and it will be held the week of Jan. 24-31, both pleasure car and business car divisions being held simultaneously. This also marks Mr. Miles' 20th consecutive season as manager of this event.

In 1900 Mr. Miles became an enthusiastic member of the Chicago Automobile Club. The side exhibit of motor vehicles in connection with the annual bicycle show in New York in 1899 had awakened the interest of manufacturers and other allied interests in the East, and Mr. Miles became convinced that something of this nature would appeal to the residents of the Middle West. The Chicago Automobile Club agreed to assist him in the enterprise and the Coliseum was engaged. Later in the year the club, however, evidently began to doubt the probable success of such an affair and Mr.

EXHIBITORS AT CHICAGO SHOWS.

85 Passenger Cars.
57 Trucks.
2 Trailers.
1 Body.
201 Accessories.

Miles was left to conduct the matter personally. How well he succeeded is now a matter of history, but it may be surmised from the fact that when the National Association of Automobile Manufacturers was organized he was selected as general manager and he has since devoted his attention to the production of these big shows in New York and Chicago.

Truck Conferences Also at Chicago.

As at New York, the highway transportation and motor conferences will be featured in connection with the Chicago show, the same general plan to be followed at the latter, but with a change in some details of the programme. The conference will open the evening of Jan. 24 in Chicago, with an important inaugural session, in which men of national reputation are expected to participate.

During the progress of the show meetings of the National Automobile Dealers' Association, the Chicago section of the Society of Automotive Engineers, and the Motor and Accessory Manufacturers' associations are held.

The following pleasure cars will be exhibited at Chicago alone: Leach, Monroe, Pilot.

Trucks to be seen only at Chicago: All-American, Armleder, Dependable, Hendrickson, Kalamazoo, Parker, Patriot, Service.

The Fruehauf trailer will also be seen only at Chicago.

Name	Passenger		Truck	
	N. Y.	Chgo.	N. Y.	Chgo.
Hale & Kilburn Co., Philadelphia, Pa.
Halladay Co., L. P., Streator, Ill.
Hart-Bell Co., Inc., New York
Hartford, Edw. V., Inc., New York
Harvey Wheel Sales Co., New York
Hassler, Robert H., Indianapolis, Ind.
Hayes Wheel Co., Jackson, Mich.
Heinze Electric Co., Lowell, Mass.
Hercules Motor Mfg. Co., Canton, O.
Hero Mfg. Co., Philadelphia, Pa.
Hill-Smith Metal Goods, Boston, Mass.
Holmes, George L., New York City
Holophane Glass Co., Inc., New York
Horizontal Hydraulic Hoist Co., Milwaukee, Wis.
Houper Machine Co., Long Island City, N. Y.
Hoyt Elect. Instr. Co., Penacook, N. H.
Hudson Motor Specialties Co., Philadelphia, Pa.
Humil Corp., New York City
Imperial Brass Mfg. Co., Chicago, Ill.
Improved Gauge Mfg. Co., Syracuse, N. Y.
Inland Machine Works, St. Louis, Mo.
International Magazine Co., New York City
Iron City Products Co., Pittsburgh, Pa.
Jaxon Steel Products Co., Jackson, Mich.
Jiffy Jack Co., Cleveland, O.
Johnson Auto. Lock Co., Chicago, Ill.
Johnston, Wm. R., Mfg. Co., Chicago, Ill.
K-W Ignition Co., Cleveland, O.
Kales Stamping Co., Detroit, Mich.
Kellog Mfg. Co., Rochester, N. Y.
Kent, Atwater, Mfg. Co., Philadelphia, Pa.
Keystone Rubber Mfg. Co., Erie, Pa.
Klaxon Co., Newark, N. J.
Laidlaw Co., Inc., New York City
La-Lo Chemical Co., Providence, R. I.
Lane Brothers Co., Poughkeepsie, N. Y.
Lauraine Magneto Co., New York City
La Vietas, Geo. E., Inc., New York City
Lawrence & Co., L., New York City
Lee Mercantile, H. D., Co., Kansas City, Mo.
Le Compte Co., Newark, N. J.
Lewis Searing Co., Flint, Mich.
Light Mfg. & Foundry Co., Pottstown, Pa.
Lightning Change Rim Corp., Chicago, Ill.
Lipman Refrigerator Car & Mfg. Co., Beloit, Wis.
Lobes Body Co., Inc., Mt. Vernon, N. Y.
Longdin Bruggen Co., Fond du Lac, Wis.
Lyons Ignition Co., New York City
M & A M A Office, New York City
McCord Mfg. Co., Inc., Detroit, Mich.
McQuay-Norris Mfg. Co., St. Louis, Mo.
Macbeth-Evans Glass Co., Pittsburgh, Pa.
Manley Mfg. Co., York, Pa.
Marlin Rockwell Corp., New Haven, Conn.
Martin, James, New York City
Meach-Morrison Mfg. Co., East Boston, Mass.
Merchant & Evans Co., Philadelphia, Pa.
Merritt, S. W., Co., New York City
Metal Stamping Co., Long Island City, N. Y.
Midwest Engine Co., Indianapolis, Ind.
Millitor Corp., Springfield, Mass.
Miller, Chas. E., New York City
Minneapolis Steel & Mach. Co., Minneapolis, Minn.
Morse Chain Co., Ithaca, N. Y.
Moto-Meter Co., Long Island City, N. Y.
Motor Car Supplies Co., Inc., New York
Motor Compressor Co., Newark, N. J.
Motor Guide, New York
Motor Klean Co., New York City
Motor Spark Plug Co., Newark, N. J.
Motor Vehicle Pub. Co., New York City
Mutty, L. J., Co., Boston, Mass.
Muzzy-Lyon Co., Ltd., Detroit, Mich.
Nathan Novelty Mfg. Co., New York City
National Carbon Co., Cleveland, O.
National Clutch Co., Inc., Irvington, N. Y.
National Tube Co., Pittsburgh, Pa.
National Wire Wheel Wks., Inc., Detroit, Mich.
New Era Spring & Specialty Co., Grand Rapids, Mich.
New York Coil Co., New York City
Nobrac Co., New York City
Northwestern Chemical Co., Marietta, O.
Oakes Co., Indianapolis, Ind.
Fantasette Co., New York City
Parker Axle & Prod. Corp., New York City
Parry Mfg. Co., Indianapolis, Ind.
Perfection Heater & Mfg. Co., Cleveland, O.
Perkins Tonneau Windshield Co., New York City
Phelps Mfg. Co., Columbus, O.

Name	Passenger N. Y. Chgo.	Truck N. Y. Chgo.
Pines Mfg. Co., Chicago, Ill.	•	•
Power Farming Press, St. Joseph, Mich.	•	•
Powriok Co., Cleveland, O.	•	•
Pratt, Wm. E., Mfg. Co., Chicago, Ill.	•	•
Presto Felt Mfg. Co., Inc., Toledo, O.	•	•
Prest-O-Lite Co., New York City	•	•
Primolite Sales Co., Westfield, N. Y.	•	•
Radcliffe Turbin-Drive Co., New York City	•	•
Rajah Auto Supply Co., Bloomfield, N. J.	•	•
Recording & Computing Machine Co., Dayton, O.	•	•
Reliance Wheel Co., Youngstown, O.	•	•
Republic Auto Parts Co., Long Island City, N. Y.	•	•
Rex Mfg. Co., Connersville, Ind.	•	•
Rich Mfg. Co., New York City	•	•
Rives, Geo. H., Mfg. Co., New York City	•	•
Robertson Cradlelock Wheel Co., Chicago, Ill.	•	•
Rockwell Mfg. Co., College Point, L. I.	•	•
Russel Motor Axle Co., Detroit, Mich.	•	•
Saltsman, Dewitt G., Co., New Haven, Conn.	•	•
Schrader's, A. Son, Inc., Brooklyn, N. Y.	•	•
Schutte, Charles, Body Co., Lancaster, Pa.	•	•
Sears Cross Co., Brooklyn, N. Y.	•	•
Security Auto Theft System, N. Y. C.	•	•
Sedgwick Sales Co., Bronx, N. Y. C.	•	•
Service Engineering Co., New York City	•	•
Sewall Cushion Wheel Co., Detroit, Mich.	•	•
Shaler, C. A., Co., Wauupun, Wis.	•	•
Shonts, H. B., Co., Inc., New York City	•	•
Silvex Co., Bethlehem, Pa.	•	•
Simms Magneto Co., East Orange, N. J.	•	•
Snead & Co. Iron Works, Inc., Jersey City, N. J.	•	•
Sparks-Withington Co., Jackson, Mich.	•	•
Special Tool Engineering Co., Dayton, O.	•	•
Spencer Metal Products Co., Spencer, O.	•	•
Spiro, C., Mfg. Co., New York City	•	•
Splittdorf Electrical Co., Newark, N. J.	•	•
Standard Steel Castings Co., Cleveland, O.	•	•
Standard Tool & Engineering Co., S. Bend, Ind.	•	•
Stanley, John T., Co., Inc., New York City	•	•
Stewart, F. W., Mfg. Co., Chicago, Ill.	•	•
Stewart-Warner Speedometer Corp., Chicago, Ill.	•	•
Story Rubber Corp., New York City	•	•
Stromberg Motor Devices Co., Chicago, Ill.	•	•
Sunderman Corp., Newburgh, N. Y.	•	•
Superior Lamp Mfg. Co., Inc., New York City	•	•
Thomas, C. B., New York City	•	•
Titanflex Metal Hose Corp., Newark, N. J.	•	•
Tonneam Shield Co., Inc., New York City	•	•
Torbenason Axle Co., Cleveland, O.	•	•
Trexler Co., Philadelphia, Pa.	•	•
Triplex Safety Glass Corp., N. Y. C.	•	•
Triplex Tire Corp., N. Y. C.	•	•
Tuthill Spring Co., Chicago, Ill.	•	•
Twin Fire Spark Plug Co., Detroit, Mich.	•	•
United Mfg. & Distributing Co., Chicago, Ill.	•	•
United States Air Compressor Co., Cleveland, O.	•	•
U. S. Light & Heat Corp., Niagara Falls, N. Y.	•	•
U. S. Specialty Co., Boston, Mass.	•	•
Unity Laprobe Mfg. Co., Inc., N. Y. C.	•	•
Universal Shock Eliminator, Inc., N. Y. C.	•	•
Utilities Sales Corp., Philadelphia, Pa.	•	•
Vacuum Oil Co., N. Y. C.	•	•
Van Sicken Speedometer Co., Elgin, Ill.	•	•
Vaporizer Utilities Sales Corp., N. Y. C.	•	•
Veedor Mfg. Co., Hartford, Conn.	•	•
Wales-Adamson Co., Chicago, Ill.	•	•
Wallace Mfg. Co., Newark, N. J.	•	•
Waltham Watch Co., Waltham, Mass.	•	•
Warner-Patterson Co., Chicago, Ill.	•	•
Wasson Piston Ring Co., Plainfield, N. J.	•	•
Waukesha Motor Co., Waukesha, Wis.	•	•
Weaver Mfg. Co., Springfield, Ill.	•	•
Wellman-Seaver-Morgan Co., Akron, O.	•	•
West Steel Casting Co., Cleveland, O.	•	•
Weston Electrical Inst. Co., Newark, N. J.	•	•
Wheeler-Schebler Carburetor Co., Indianapolis, Ind.	•	•
Whittington Mfg. Co., Montrose, Pa.	•	•
Wildenberg Bros., New York City	•	•
Willard Storage Battery Co., Cleveland, O.	•	•
Williams, J. H., Co., Brooklyn, N. Y.	•	•
Wilson, K. R., Buffalo, N. Y.	•	•
Wire Wheel Corp. of America, Buffalo, N. Y.	•	•
Wisconsin Motor Mfg. Co., Milwaukee, Wis.	•	•
Woodworth Mfg. Corp., Niagara Falls, N. Y.	•	•
World Mfg. Co., Richmond Hill, N. Y.	•	•
'X' Laboratories, New York City	•	•
Yale & Town Mfg. Co., Stamford, Conn.	•	•
Zenith Carburetor Co., Detroit, Mich.	•	•

*Indicates will exhibit.

Big Aerial Exhibition at Chicago

Indications now point to the fact that one of the biggest aeronautical exhibitions ever held in the country will be seen at the Coliseum in Chicago the week of Jan. 8.

It will epitomize the progress that has been made in this and foreign countries in the science and application of aeronautics both during and since the close of the war. It will be largely educational in its nature, depicting the history of the airplane from its inception to its present development. It will undoubtedly include types of lighter-than-air-craft, as well as sea planes of various designs.

One of the purposes will be to show the utility of the modern airplane for the transportation of passengers and freight, especially its availability where quick service is the desideratum.

There will be included a representative display of aeronautical equipment and supplies, and the exhibition is receiving the sanction and support of the important manufacturers of these components, who are recognizing this as a wonderful opportunity for presenting their product to the general public from an educational standpoint.

One of the recent applicants for liberal space is the Goodyear Tire & Rubber Co., Akron, O., which built more than 1000 balloons for the government.

ANNUAL SHOW DIRECTORY.

The Sixth Annual Directories for the New York and Chicago national automobile shows are being prepared by F. Ed. Spooner, 420 Book building, Detroit, editor of the Automotive World department of the Detroit Free Press. The Free Press issues these directories annually for the benefit of the exhibitors and all visitors of the automotive industries at the national shows. In addition to the features which have been carried in previous years there will be added for the 1920 national shows a department containing the names of visiting automotive dealers and distributors from the entire United States, the names of firms and their representatives.

The Annual Directories will include a list of all hotels in each city, with address and telephone; the events scheduled for the week; the calendar of the show circuit; newspaper and automobile editors present; scheduled headquarters of all prominent companies; names of advertising managers and their headquarters; names of national associations and their officers; and the names of all companies, whether exhibitors or not, in the automotive field, with names of representatives and their stopping places.

Mr. Spooner wishes to emphasize the necessity on the part of all concerns or individuals affiliated with the automotive industry who desire to be included in this directory, of sending in names, addresses, etc., at the earliest possible date as, on account of the size of the compilation, lists received late will necessarily be omitted.

Radical Measures Are Necessary to Curb Recklessness

Some Cities Are Enforcing Unusual Penalties for Carelessness on Part of Autoists

THE tendency to resort to radical measures in order to curb recklessness and carelessness on the part of both the motorist and the pedestrian is exemplified by recent developments in the following cities:

Chicago, where automobile speeders are sentenced to make slow trips through the morgue under the guidance of a deputy coroner.

Youngstown, O., where the automobile speeder is sentenced to hold watch beside the body of the person killed by his machine or at the hospital bedside if the accident victim is injured.

New York City, where a "rogues gallery" for traffic law offenders is maintained by the police department. (A plan to photograph and finger print chauffeurs has been proposed to the Chicago Board of Aldermen.)

St. Louis, where a grand jury after being in session for four months submitted a lengthy report, two-thirds of which was given over to the recommendation of public safety measures.

During 1917 more than 1800 persons were killed and more than 4600 persons were seriously injured in crossing accidents on the railroads of the United States. The greatest number of these accidents were cases of automobiles being struck at highway crossings and of automobiles running into trains at crossings. It is toward the elimination of such conditions that the activities of the National Safety Council and of the United States Railroad Administration in the present accident prevention drive are directed.

The intensity of the contest between St. Louis, Cleveland, Rochester, Detroit and a number of other cities for the title "Safety City in America," is revealed by a most unusual report submitted to the Circuit Court at St. Louis a few days ago by a most unusual grand jury. Deviating from the beaten paths of grand jury procedure, the St. Louis inquisitorial body, in the words of its foreman, Clarence

Howard, president of the Commonwealth Steel Co., decided that its goal "should not be merely to indict some one for something," but that a constructive consideration of the causes of those things for which people are indicted would make a constantly decreasing number of indictments necessary.

On investigation the grand jury found that one of the principal sources for criminal indictments was the automobile accident resulting either from the recklessness of the motorist or the carelessness of the pedestrian. And so instead of indicting "someone for something" the grand jury set about making a deep study of traffic conditions.

The jury called in Arthur T. Morey former president of the National Safety Council, Carl L. Smith, public safety field secretary of the safety council, and other local safety experts and asked their advice on how to make the streets of St. Louis safe. On the suggestion of Mr. Morey the grand jury discarded another long established rule, that of hearing only one witness at a time and boldly called in all the available safety talent, with the result that the final report of the grand jury made the following recommendations:

1. That additional traffic and motor-cycle officers be employed.
2. That police officers, other than those of the traffic squad, be thoroughly familiar with traffic regulations and that they be required to make reports of all such violations observed.
3. That consideration be given to the working out of a plan of one-way traffic

east and west, where there is great congestion.

4. That an ordinance be adopted requiring pedestrians to cross the street at regular street crossings.

5. That action be taken giving newspaper publicity to the existence of various associations promoting safety, and that the public be requested to co-operate with such associations by reporting to them cases of reckless driving and violations of traffic laws, such reports to contain the license number of car, place, time and nature of violation.

6. That some plan be worked out in all schools to impress upon the students the importance of safety. Daily talks by teachers in the class rooms and safety contests between schools are suggested.

7. That publicity be given the safety movement in the Sunday schools, churches and homes.

8. That necessary action be taken for the enactment of a state law requiring that every employed person driving a motor vehicle pass an examination before a board.

9. That upon the enactment of this law a board be created in the city of St. Louis to instruct all drivers of motor vehicles how to comply with traffic regulations and how to handle motor vehicles safely. This board will examine drivers to ascertain whether they possess the necessary qualifications, such as normal sight, hearing and other qualifications. Upon meeting all of the requirements the driver shall receive from this board a certificate, which, upon presentation to the license collector, together with a signed statement by the driver that he will use due caution and observe all traffic and safety laws and regulations, will entitle him to a license.

10. That an inspection board be created to inspect at regular intervals all motor vehicles to see whether they are in safe condition.



New Features in Cars Displayed at 1920 Shows

Refinements in Body Design, Novelties in Furnishings and Equipment and Further Power Plant Standardization Are Noted

IT IS prophesied that the 1920 automobile shows will mark an epoch in the industry, as manufacturers are going into them with fresh vigor and zeal to make up for the abnormal years caused by the war. These events have in a measure always presaged the season's offerings in the way of new models, additional refinements and modifications in standard forms, and the coming exhibitions will prove no exception. The visitor will be greeted with a wealth of designs embracing the widest range of beauty, comfort and utility and appealing to every taste, from the simplest type of roadster to the most luxuriously appointed enclosed car. In all probability never before has such a favorable opportunity been afforded to examine and compare the latest and best products of the automotive industry.

On account of the hindrance to production caused by the widespread labor difficulties and the unsettled condition of the material market, manufacturers this year have not been able to supply dealers and the motoring public with the latest models as much in advance of the annual shows as has been the case heretofore, and many intending purchasers will thus be given their first opportunity at the shows to examine closely the new cars as they have been created and redesigned by the manufacturers.

Many changes will be noted by the critical motorist in the season's offerings, and this is perhaps more characteristic of some of the older lines of cars. Refinements that are particularly noticeable are seen in body designs. The oval edge along the side of the body at the top of the door has given way to a beveled edge with square corners that is more pleasing to the eye. The cowl of the dash is made deeper, occupying considerably more room, giv-

ing ample space for the instrument board upon which is placed the lighting and ignition switch, speedometer, priming device, clock, etc.

The critical purchaser will note the prevalence of wire wheels and cord tires on many of the models, as these have been adopted by the manufacturers as standard equipment in many cases.

The top material now generally used, although an imitation of leather, has all the appearance of genuine leather, even to the ribbed effect. This fabric has been adopted after several years use during which it has proved its utility, and in many cases is considered even better than leather, holding its shape well when folded. The cost of leather has made its use practically prohibitive except on the highest priced cars, and even the manufacturers of these cars frequently prefer to use the leather substitute.

Upholstery and Seating Arrangements.

On the lower priced cars imitation leather is widely used for upholstering seat cushions, backs of seats, sides, etc.,

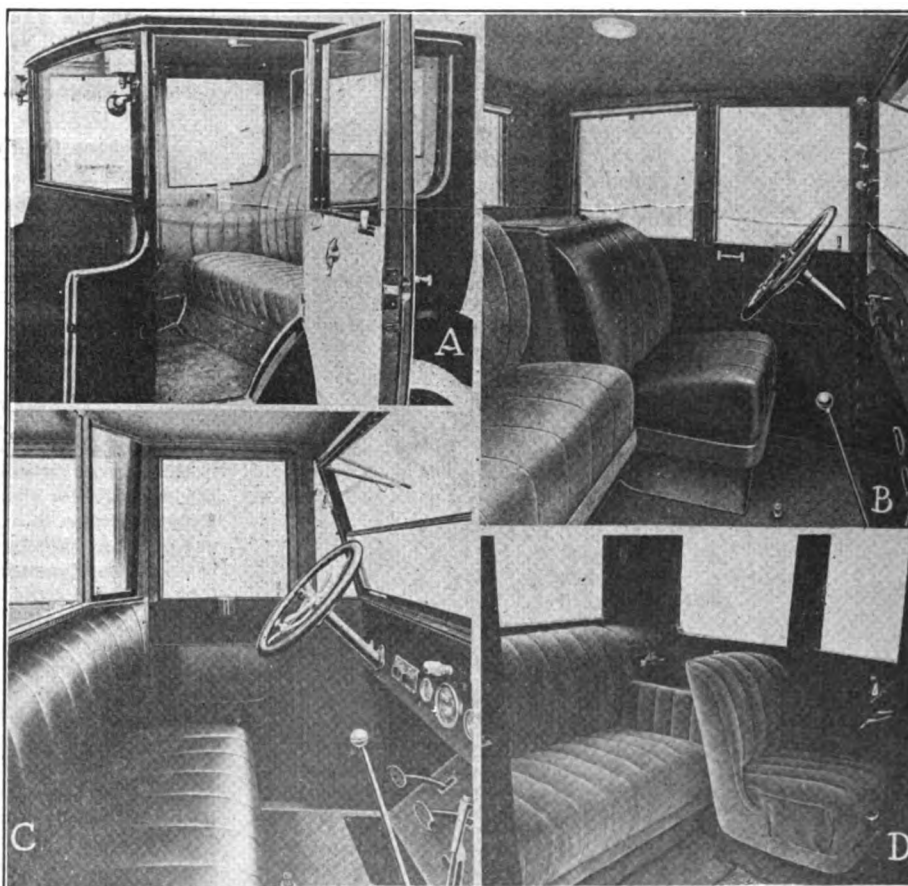
as it may be dressed as often as desired, will not crack the clothing and wears equally as well as genuine leather, and can be supplied at a fraction of the cost.

Closed cars are also upholstered in whip cord, plush or corduroy, according to the price of the car; all these materials are durable and require little care to keep them clean.

Another improvement that will be noticed by the critical purchaser is the greater depth of the cushions, the better grade of springs used and the luxurious finish of the upholstery and the comfortable riding qualities of the cushions. Many manufacturers are placing large pockets in the linings of all doors, and in some cases these are utilized to provide for the storage of tools in the front left hand door pocket, or under the right hand side of the cowl, between the side of the cowl and the covering. These tool pockets are easily reached by the operator by simply lifting a flap which is held down by a button or catch.

The interior fittings of enclosed cars show many refinements over previous years, harmonizing with the general interior design and adding a desirable richness of tone.

The seating arrangements of the latest models of both open and closed cars will be found to suit the taste of the most fastidious purchaser. Some open models have the divided front seat, which has proved so popular in the past, while others are provided with the undivided seat, the latter also being noticeable in some sedan models. Designers of this type of enclosed car are, however, still adhering to the custom of using two front seats, each independent of the other, one of them being pivoted in such a manner that its position may be reversed, allowing the occupant to face those in the rear seat. In other



A, B, C and D Give an Idea of the Luxurious Interior Fittings of 1920 Enclosed Cars, Showing Seating Arrangement, Convenience of Dash Control Instruments, Etc.

cases a change has been made to the straight seat, but this is more typical of larger cars of limousine type, where passengers and driver are completely enclosed. Certain cars have been equipped with a device that is attached at the bottom of the rear seat, which raises and lowers the seat, adjusting the height to the convenience of the passengers.

Other cars are provided with compartments at the rear of the front seat, having panelled doors neatly designed and equipped with locks in which can be stored articles of value. These doors and their fittings add to the appearance of the car.

Tilted Steering Wheel.

There is seen a tendency among many manufacturers of the better class to provide features that heretofore have necessarily been purchased by the motorist as extra equipment. One of these is the tilted steering wheel, which now comes on quite a number of models. It is designed to enable the operator, upon leaving the car, to raise and tilt the wheel, thereby securing room to get out on his own side of the car without troubling the other occupant of the front seat or going to the inconvenience of passing around the car.

Visitors to the shows will be sure to note favorably the improvement that has been made in both open and closed models in the widening of doors. In the past designers have shown a tendency to make them rather narrow, but the 1920 cars have doors of ample width.

Many manufacturers are showing points of refinement in the fitting of running boards, fenders and lamps. The tread of the running board is covered

with linoleum and the edges are bound with aluminum, rubber matting being placed at the door openings in some cases, giving a firm foothold when getting into or alighting from the car.

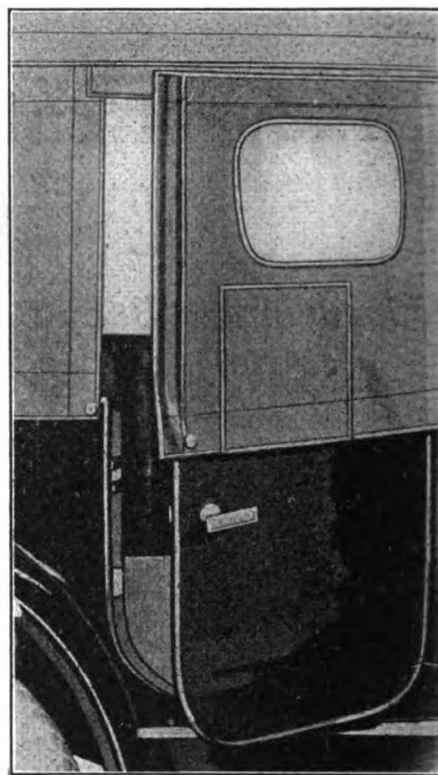
Head lamps are of a wide variety of design, some showing a marked tendency towards greater ornateness, while others retain the simplicity that has been the vogue for some time. Many types of door locks will be noted, some opening at the top edge of the door, others on the outside by means of a knob with a lever for opening the door from the inside of the car.

Mud aprons are provided at the front of the car at the bottom of the radiator extending downward designed to prevent water and mud from splashing up on to the front of the radiator core.

Comparison of Engine Designs.

In comparing engine designs as offered in the many cars shown, the motorist should note the tendency of the manufacturers to enclose the valve mechanism. On engines of the L-head type some method of enclosing the valves has been employed for several years past, but it is only recently that provision has been made for enclosing the valves of engines using the overhead form. The difficulties encountered have been nicely overcome by the designers and the results will be seen on many of the cars exhibited at the shows.

Accessibility is a feature that should prove of interest to the motorist, as it has a considerable bearing on the cost of repairs, for the time spent by the repair man in gaining access to the power plant is one of the important factors in determining expense. Also, if the pur-



Method of Fastening Door Curtain on Grand Six Touring Car. When Opening Rear Door, Curtain Swings with Door. Note Large Light in Curtain.

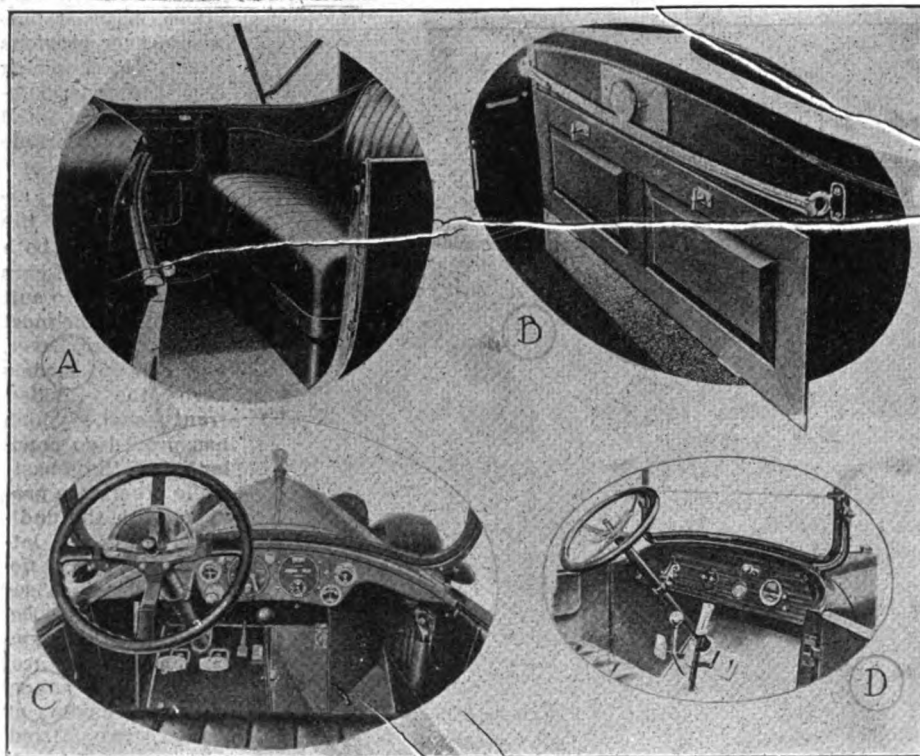
chaser intends to make his own minor repairs, the convenience of ready access to the mechanism is borne strongly in mind when examining cars. Accessibility thus might be considered the keynote of the power plants of the cars on exhibition at the national shows, this applying to the chassis construction and its units as well as to the engine and its components, and manufacturers have redesigned their cars in many cases with this idea in mind.

Reasons for Enclosing Valves.

The reason for enclosing the valves of the engine is two-fold, to reduce the sound of their operation and to prevent dust and dirt from entering the bearings.

The experienced motorist, who is contemplating the purchase of a new car, will in all probability be much more interested in the power plant than he will be in the convenience, fittings and finish of the car body. Manufacturers for 1920 have still further advanced in the standardization of this component, as will be noticed from a careful examination of the cars at the shows. A number of refinements are in evidence, such as the use of a hot spot in the exhaust manifold to heat the incoming charge of gas before it reaches the combustion chamber, and the installation of other devices designed for the better utilization of the lower grades of gasoline now on the market.

In examining the lubricating systems of the various engines it will be noted that a change has been made by some makers in getting away from the splash systems that have so long been considered as reasonably efficient and turning towards some form of force feed system, or a combination of the two. Two reasons

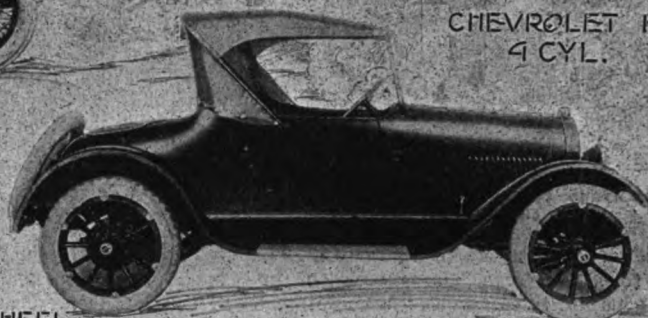


A, Large Door Openings, Deep, Luxurious Cushions and Upholstery and Plenty of Pocket Space in Doors Are Features of New 1920 Marmon 34 Model; B, Storage Under the Front Seat, with Hinged Door Opening at Rear, with Tonneau Light and Leather Robe Rail Are Featured in National Sedan; C, Convenience of Dash Control Instruments, Location of Spark and Throttle on Steering Wheel and Tool Pocket at Right Are Noted in Packard Twin Six; D, Convenience of Control Units as Seen in Dort Car for 1920.

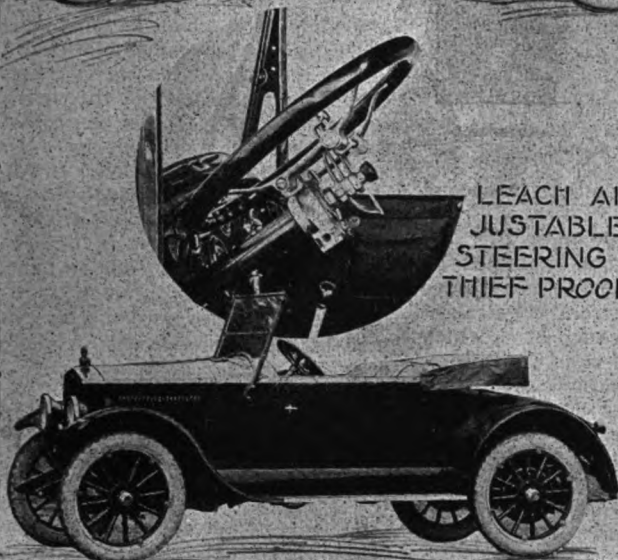
STUTZ H
4 CYL. 16 VALVES



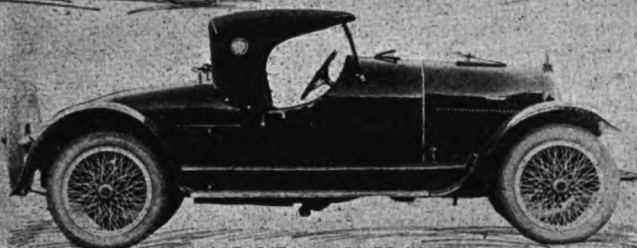
CHEVROLET FB
4 CYL.



LEACH AD-
JUSTABLE
STEERING WHEEL-
THIEF PROOF LOCK



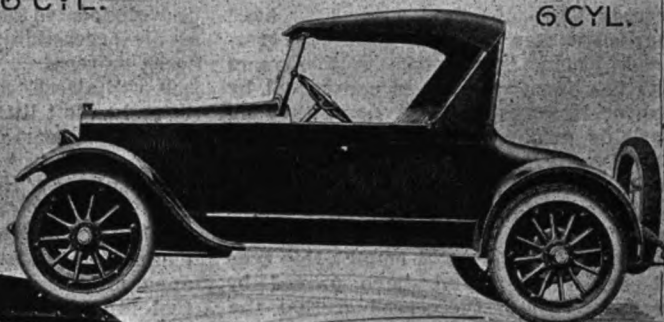
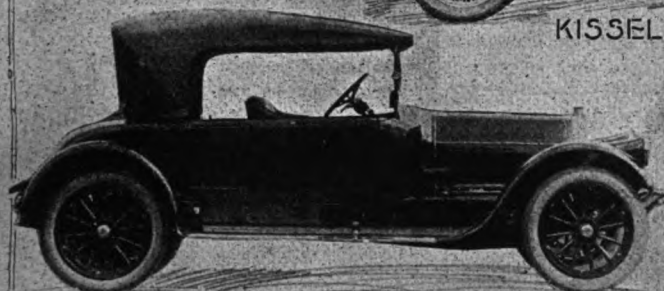
ESSEX A
4 CYL.



ANDERSON S-30
6 CYL.

KISSEL 6 CYL.

CLEVELAND
6 CYL.



PIERCE-ARROW 48-B-5
6 CYL.

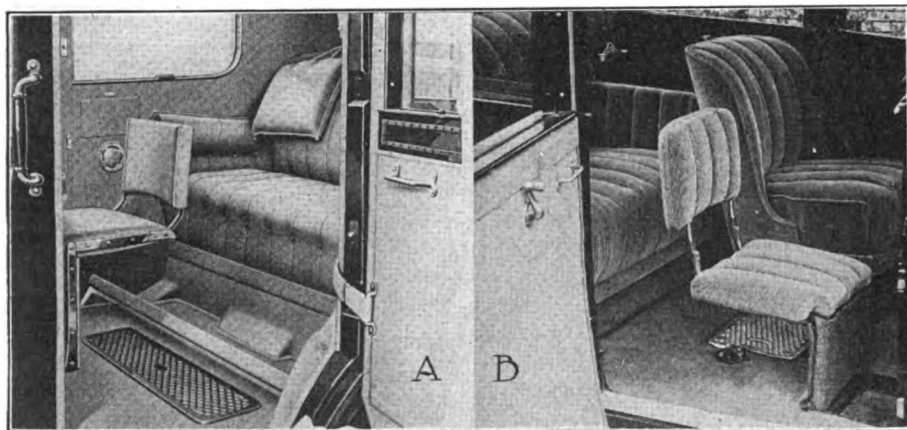
SPARE WHEEL CARRIER-
KING ROADSTER



MAXWELL 25
4 CYL.



PILOT 6-45



A, Luxurious Interior Fittings and Deep Upholstery of 1920 Chalmers Limousine;
B, Interior Fittings and Heating Device of Haynes 1920 Sedan.

are advanced for the more general use of the force feed form. The tendency of the buying public is to choose cars equipped with multi-cylinder engines which are adapted only for straight force feed lubrication or a modification of force feed and splash. The second reason is the tendency to build engines developing high speed to deliver their indicated power, and engines of this type must necessarily be equipped with a force feed lubrication system, otherwise they will not satisfactorily do the work for which they were designed.

L-Head and Overhead Type.

This year there is a wide choice between cars employing the L-head type of valves and those employing the overhead form. Many manufacturers that heretofore have built only cars using the L-head are now employing the overhead type. Many improvements have been made in the latter form of engine in the last few years, most of the modifications, however, being of a minor nature and more in the way of refinements. The introduction of the separable head marked a step in advance in the overhead design, as previous to two years ago this form was not in use except by one or two manufacturers, and they invariably employed a cage in which the valve was ground and placed in the cylinder head, a gasket being used to take up the space between the cage and cylinder head and make it gas tight. Certain manufacturers still employ this type of construction and have proved by years of use in their product that the principle is correct. An item of cost enters into their use, however, which has been eliminated by employing the separable head and grinding the valves into seats located in the head. Engines with this type of construction have still another advantage not possible where the valves are placed in a cage; that is, the pistons may be removed and replaced through the top of the cylinder after the head has been removed, thus saving time when overhauling the engine.

Another point that the motorist will note is the tendency of the manufacturer to weight the crankshaft with counter weights, which are placed at each side of the connecting rod bearings and are cast integral with the crankshaft. Their function is to enable the engine to run more smoothly when accelerating, slow-

ing down and starting either in second speed or high gear.

Timing Gears Changed.

Timing gears should be examined by the motorist, as manufacturers have changed in many cases from the straight cut tooth to the herring bone form, which offers many advantages over the former, the chief of which is the fact that a train of gears with herring bone cut teeth operates much more quietly than when fitted with straight cut teeth. The reason is obvious, as in the herring bone type three teeth on each gear are in mesh at the same time, while in the other form, but one tooth of one gear is in mesh simultaneously with that of another and there is a greater chance for back lash and unnecessary noise.

Engines employing silent chains to operate the cam and pump shaft are fitted with the highest grade chain obtainable. It is very important that this chain should be of the best material and design, as the proper operation of the engine depends on its functioning properly. Although located out of sight it should be easily accessible in the event of adjustment or repair.

It will also be noted that the manufacturer has left little need on the part of the motorist to experiment or "tinker" with the mechanism, as the engines shown are apparently as near fool proof as it is possible to design them.

Certain manufacturers are placing the generators that supply the electric current for the storage battery and lights in an elevated position rather than at the side of the engine. This is particularly noticeable in cars of the six and eight-cylinder type, certain sixes having it located in the rear of the fan, fastened rigid to the engine

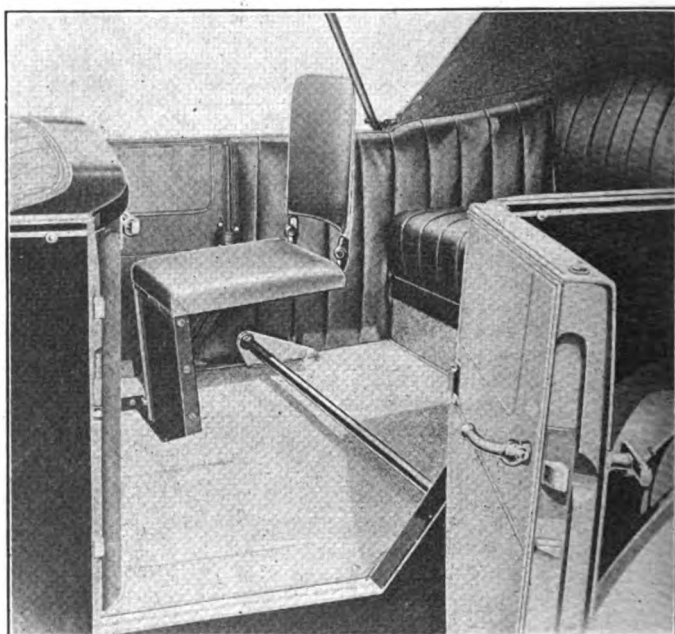
block and driven by the fan belt from the crankshaft pulley. One or two of the eight-cylinder engines employ the same location for the generator and according to reports from owners of these cars, the location has proved as satisfactory as the usual position at the side of the engine and driven from the pump shaft.

Many devices are shown for heating the enclosed models; most of these make use of the gas from the exhaust pipe before the gas enters the muffler, it being conducted to the heating device through a flexible tube which is long enough to allow for the movement of the car body due to the play of the springs, etc. The exhaust gas is admitted through a gate or shut off valve that is controlled from the driver's compartment by a cord or chain passing down through the floor to the valve. In other models the control valve is located at one end of the heater and is opened or closed by the occupants as desired. Heaters of this or some other type are being quite generally supplied by the manufacturers for their enclosed models this season, especially in the high-priced cars.

Methods of Ignition.

The methods of ignition employed do not differ materially from those used for the past year, the same general forms of ignition as perfected some time ago being retained. The generator and storage battery are the principle source of the ignition current, but some manufacturers deem that the engine operates more efficiently and develops greater power when a high-tension magneto is used as an independent source of the ignition current.

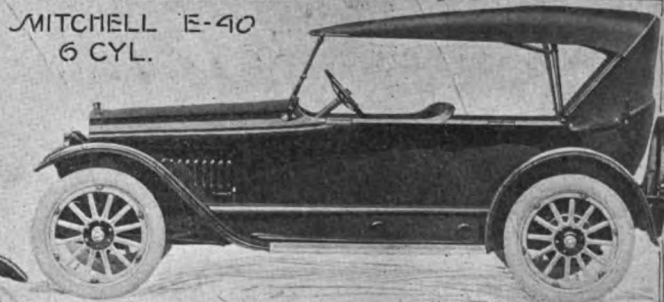
Better methods of carburetion are coming into use for this season's cars and the tendency seems to be to assist the motorist in solving the problems forced upon him by the use of lower grades of gasoline. Heating devices of various types are fitted to the engine in accordance with the individual idea and



Large Door Openings, Convenience of Extra Seats and Deep Upholstery of 1920 King Seven Passenger Touring Car.



ALLEN 43-P
4 CYL.



MITCHELL E-40
6 CYL.



BRISCOE
4-24



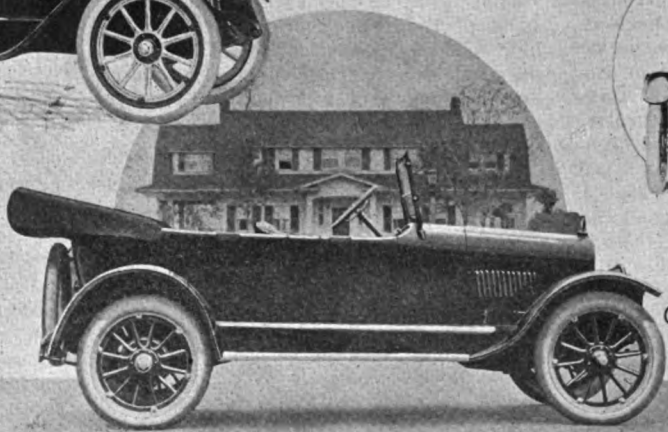
ELGIN K
6 CYL.



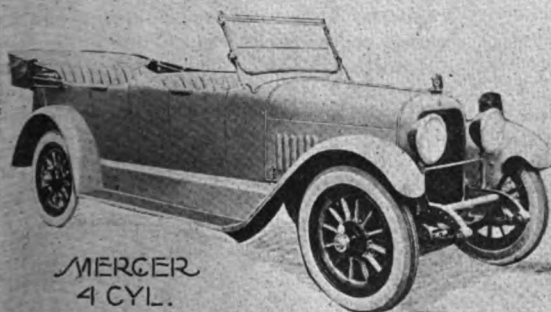
DORD 10-15
4 CYL.



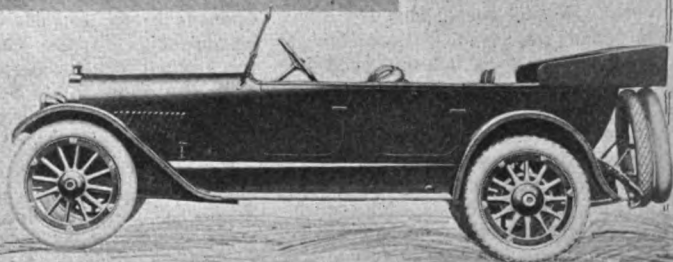
HUPMOBILE - DASH CONTROL



CROW-ELKHART H-55
6 CYL.



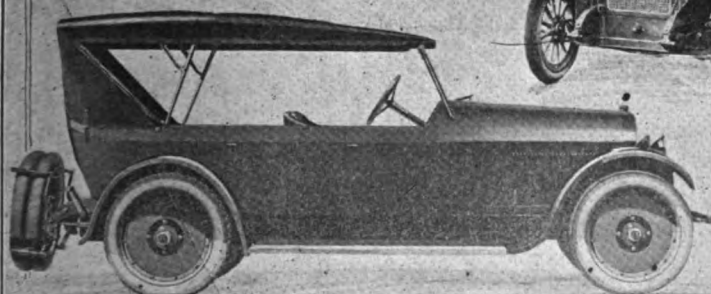
MERCER
4 CYL.



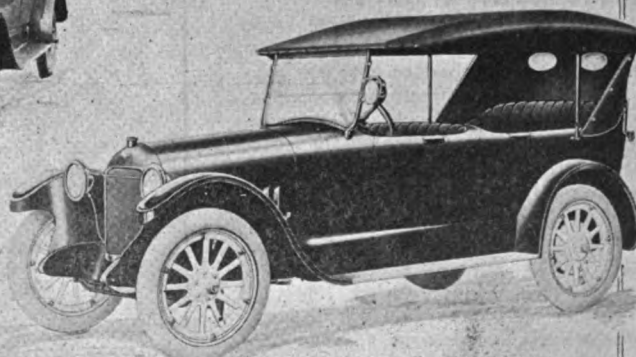
OLDSMOBILE 45B 8 CYL.



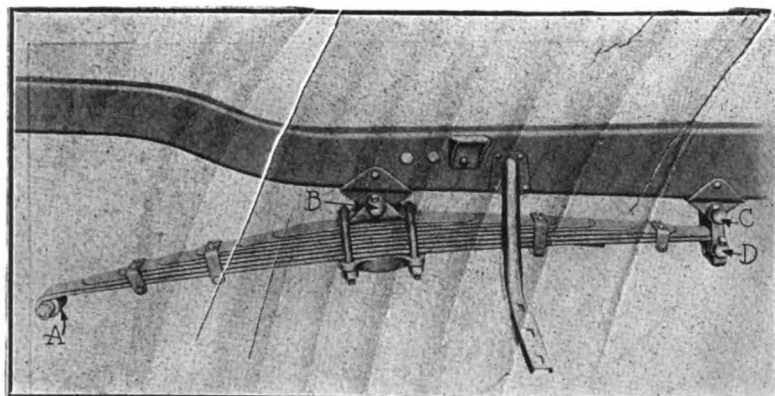
COMMONWEALTH 4-40



WESTCOTT C-48 6 CYL.



PAN-AMERICAN 6-48



Typical Cantilever Spring—A, End of Spring Fastening to Rear Axle; B, Center Spring Hanger Fastened to Bracket on Frame of Car; C, Front End of Spring and Shackle Fastening to Bracket on Frame of Car by Bolts C and D.

experience of the designers. Some makes of engines have the carburetor located quite close to the intake valves, a short intake manifold being used, while others are placed more at a distance, a longer intake manifold being employed. Both types have their advocates and both seem to operate efficiently under the conditions demanded of them. Exhaust gases are admitted to a jacket surrounding the air chamber of the carburetor, heating the fresh fuel as it enters the air in the carburetor; the operation of the device is controlled by a shutter working in conjunction with the throttle valve, closing as the engine reaches higher speeds, the exhaust gas being used only at slow or intermediate speeds. A heater is also sometimes attached to the exhaust pipe and is connected to the air inlet of the carburetor by flexible tubing; this device warms the air before it enters the carburetor.

Dry Disc Clutch Used.

Many manufacturers are using the disc clutch in their cars, some for the first time this season and others retaining it after several years of use. The dry disc type, composed of several discs faced with asbestos, seems to be employed in a majority of cases, although others prefer the single disc type, which differs somewhat in construction from the multiple disc, as only one steel disc is used. A few manufacturers retain the cone clutch in their latest models. The multiple disc clutch is claimed by its advocates to be light in action, easy to operate and requires little lubrication or adjustment to keep it in working order. These features appeal to the average motorist.

Tire and Wheel Carriers.

The motorist who visits the New York or Chicago show will probably note the various devices attached to cars for carrying extra tires on demountable rims or extra tires on wire wheels. These devices vary on the different makes of cars, some consisting of a frame made of steel tubing brazed together forming a triangle fastened to the body of the car by brackets and supporting, at the points of the triangle, a rim for carrying the extra tire mounted on a demountable rim.

One device employed for carrying extra wire wheels consists of a large hollow horn of steel fastened at the back of

a touring car to a cover over the main fuel tank by four rivets passing through a plate brazed to the bottom of the horn. The carrier extends backward for some distance from the car body and is provided with a

special winged nut is fitted, some form of padlock securing the wheel to the hanger. Roadsters have provision made on a deck or platform let into the back of the seat in which the wire wheel fits, being fastened to a carrier somewhat shorter than the one previously noted and locking in the same manner. Other roadsters carry the extra wheel at the back of the car as first described, but held to the car body by special flat brackets that support the wheel at its outer end by means of a hollow horn as for the touring car.

Considerable improvement will be noticed in the manner of applying curtains to touring cars and roadsters. The rear curtain, instead of fitting squarely to the back edge of the seat comes around and fastens at a point under the bows, extending up the bow and secured to it by patent fasteners. A short curtain fills in the open section to the rear door, while the door curtain is separate and opens and closes with the door to which it is attached by a rod fitting into an opening in the top edge. A pocket made at one side of the curtain fitting over the rod allows the curtain to swing open with the door. This device is applied to all four doors and proves a very satisfactory arrangement.

Several forms of universal joints are used in this season's cars, all of them designed with the idea of obtaining a joint that will retain the lubricant and

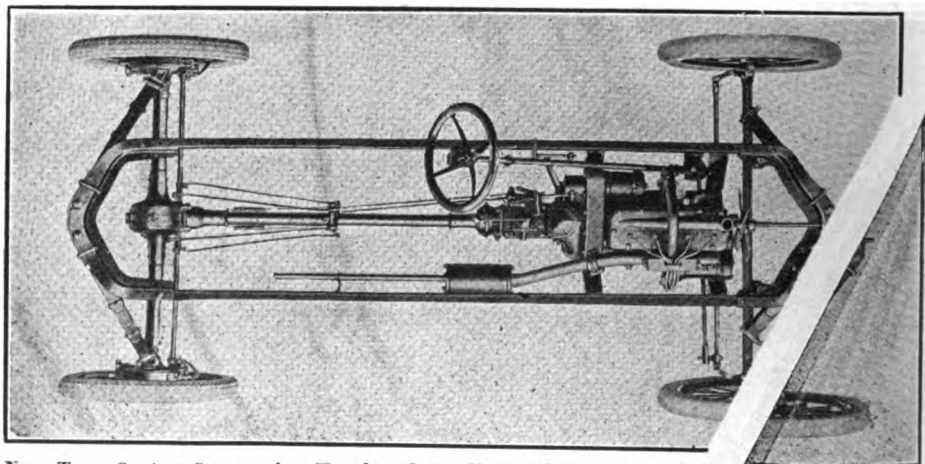
at the same time exclude dust. Certain makers employ the Spicer joint, which has proved its merits by many seasons of use, while still others use a single joint of the Spicer type, but with a torque tube supporting the propeller shaft.

Very few changes will be noted in the rear systems of the 1920 cars, as the type of axles that has been in use for the past few years has proved unusually efficient. A few designers still make use of the semi-floating axle which, after its many years of use, has many points in its construction that recommend it. The later forms of semi-floating axle have eliminated many of the unsatisfactory features of the earlier types, so that the axle as found in the season's cars is highly efficient from every point of view. A majority of the cars are using the full-floating type, which has come to be accepted as standard by many manufacturers. The many advantages of this axle are well recognized.

Manufacturers are showing a tendency to adopt the herring bone type of bevel ring and pinion in the 1920 cars. This form has many points which recommend it to the motorist, chief among which is quietness of operation.

On differential gears the form of construction that has been employed by manufacturers for several years is retained. Special differentials are obtainable, however, in Ford and Chevrolet cars, for which the manufacturers make many claims, among them, that it is designed to overcome slippage of the wheels when driving over soft ground or wet pavements.

Judging from the season's models, manufacturers seem to be divided on the question of spring suspension, as some consider that the cantilever rear spring and half-elliptic front spring is the best practise, while others think that half-elliptic, both front and rear, better answer the purpose. Light car manufacturers are thoroughly of the opinion that the short cantilever spring meets every requirement, while one manufacturer in particular goes still further and suspends his springs from the front and rear end of the frame, which overhangs the axle by several inches, the end of the spring being fastened to perches on the axles.

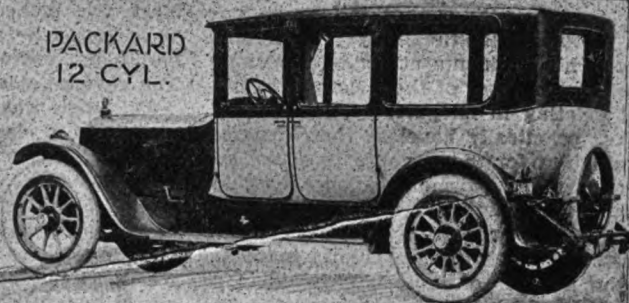


New Type Spring Suspension Employed on New 1920 Overland Chassis Lines.

Four-Wheel Trim



GRANT
6 CYL.



PACKARD
12 CYL.



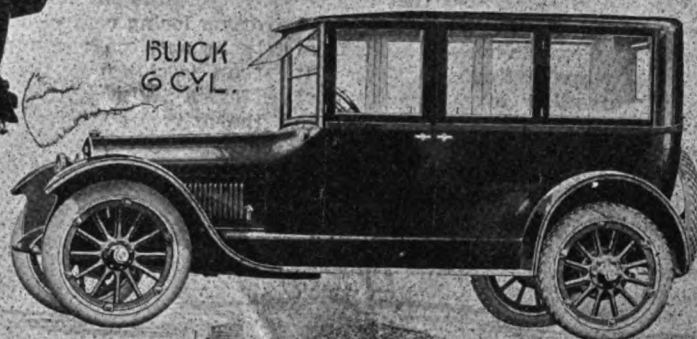
INTERIOR
OF CHANDLER 6



FRANKLIN
6 CYL.

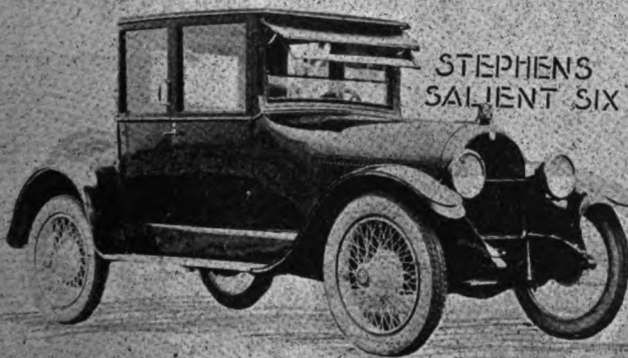


CHALMERS
6 CYL.

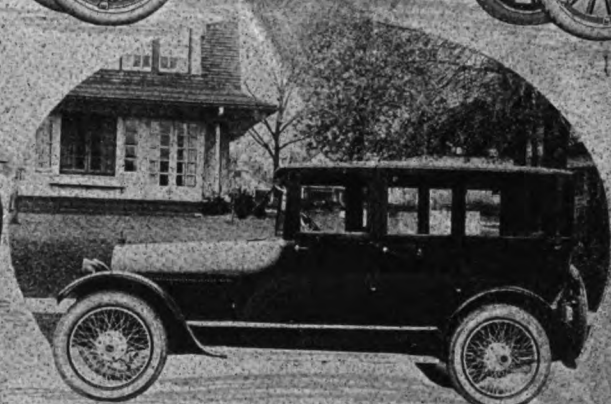


BUICK
6 CYL.

DRIVER'S SEAT - LIBERTY 6



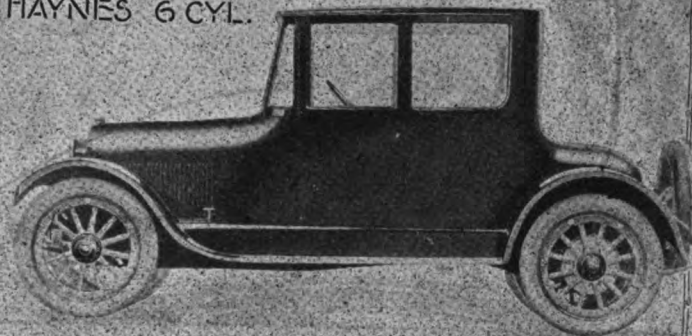
STEPHENS
SALIENT SIX



HAYNES 6 CYL.



OAKLAND
6 CYL.



REO 6 CYL.

To Eliminate the Grade Crossing Menace

EVEN the most casual readers of the newspapers cannot fail to be impressed by the daily accounts of automobile accidents at grade crossings. The large number of these danger points still existing in all parts of the country makes practically hopeless their general elimination for many years to come, on account of the enormous expense it would entail to change all crossings from the level to the subway or overhead form. This, together with the annual increase in the number of motorists, presents a situation which is now receiving the urgent attention of public service commissions in all the states.

The various railroad corporations and the public service commissions in 19 states have now got together on a definite initial programme to cope with this ever growing evil, the grade crossing accident and its attendant loss of life. In these 19 states laws have been passed providing for uniform warning signs and similar legislation is expected in all other states so that in the near future the danger sign, familiar to the automobilist in his own town, will greet him in all parts of the country.

One Uniform Sign.

The benefit of having one uniform sign all over the country was apparent from the start. A warning post that has become familiar in roads near home would convey a warning hundreds of miles from home with more distinctness than if it were of unfamiliar size, coloring and form. The fact that the railroads are to furnish the signs insures uniformity.

The sign advocated for general adoption at all grade crossings is to be placed on a metal post five feet high so as to bring it within the focus of automobile lights. It is to be a metal disk 24 inches in diameter, with a white field on which

the letters "R. R." are to be painted in black five inches high, $3\frac{3}{4}$ inches wide. There is to be a one-inch black border, and black cross lines $2\frac{1}{2}$ inches wide. The reverse side is to be painted black.

This sign was the result of many experiments in sizes and colors. Altogether it gave the best results. Several words, it was decided, would not do as well, because it is well known that the sign language is much more peremptory and startling than any spoken or written words. Something was also needed that would instantly reply to a passing glance with a silent cry of warning. In some states the law provides that the drivers of all vehicles shall slow up on seeing the sign and have their vehicles under perfect control. In order that the signs might give ample and timely warning the law provides that they shall be placed on both sides of the tracks and at least 300 feet from them.

To illustrate the alarming increase in grade crossing catastrophes in late years it may be cited that in such a comparatively sparsely populated section as New Mexico there occurred on one railroad in six months 233 accidents, in which 81 persons were injured and 18 killed, and in all of them the vehicles were practically demolished. The fact that a number of the accidents result from the driver losing control of his vehicle, mainly because no warning reaches him in time, is shown by the fact that in New Mexico, 111 accidents occurred because the drivers endeavored to pass in front of moving trains, 59 drivers ran into trains and 19 ran into the gates which had been lowered.

At a recent meeting of the National association, at which the best method of preventing accidents at railroad crossings was discussed, it was stated by C. L.

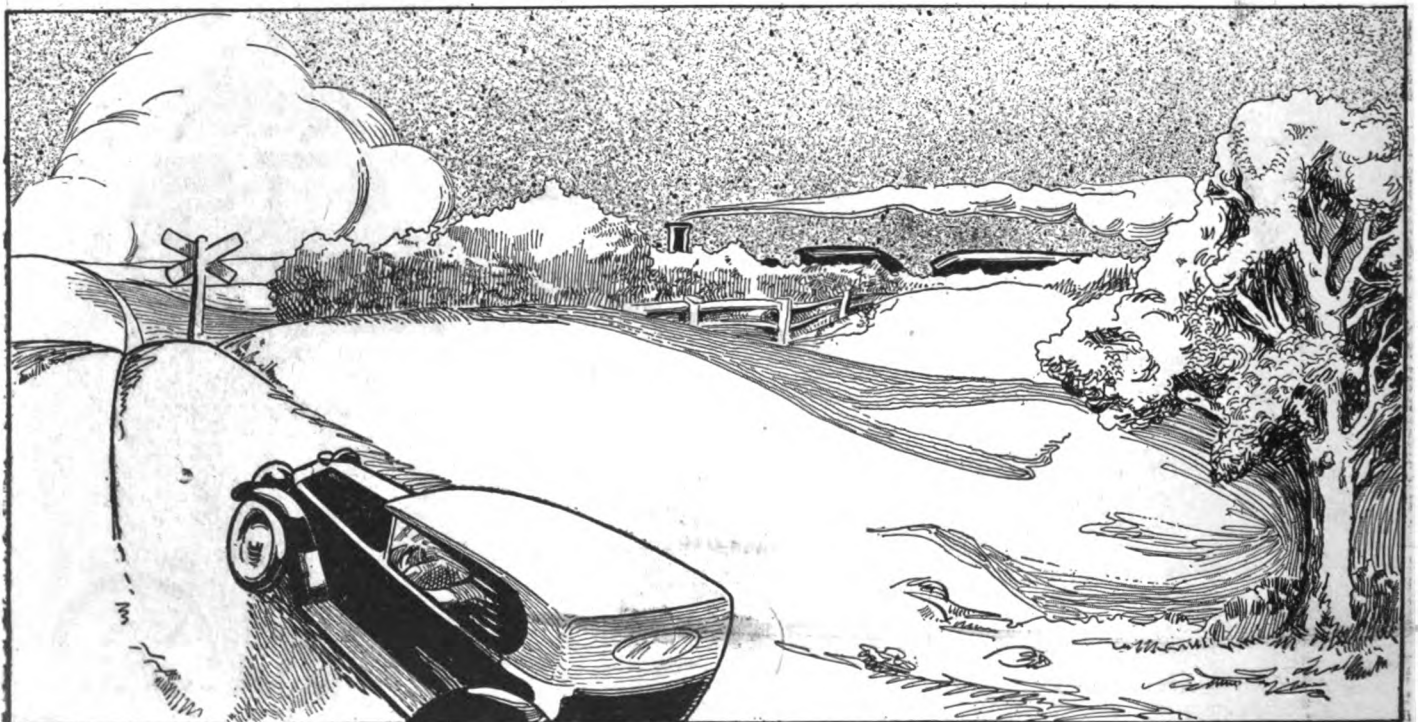
Bardo, general manager of the New York, New Haven & Hartford Railroad Co., that a distinct obligation rests upon the railroads and the community as a whole to see that the progress of vehicles in and out of the states is made safe.

Mr. Bardo said that when a driver saw a warning sign it meant stop, but when no sign was visible it meant that all was safe and that there need be no check in the speed. Speaking of the double danger, to the persons in an automobile and to those in a train in the event of a collision between the two, Mr. Bardo said:

Danger to Trains.

"The danger of trains striking an automobile exists in fact. In one case the engine of a passenger train went over the bank and the engineer was killed. It does not take much to put an engine off the track. There is a great deal of danger involved in striking an automobile, particularly if you get the parts of the automobile under the locomotive."

Another feature of this problem which undoubtedly will receive the same attention as the placing of the warning signs, is the matter of high banks, trees and brush on the road sides at railroad crossings which obstruct the view and make it impossible to see either way along the railroad tracks without leaving the car and walking ahead; this is a precaution which the average automobilist invariably neglects to take, even in view of the fact that some courts have denied damages to accident victims on this very ground. Some states have a law requiring the railroads to remove any material which would obstruct or interfere with a clear view from either side of the crossing. The enforcement of this law and the passage of a similar one by those now lacking it will be a step in the right direction.



Causes of Engine Troubles and Their Remedies

THE purpose of this article is to explain, and of the accompanying chart to show, the causes of failure of engines to function, the conditions that may be identified by observation, and the adjustments or repairs that must be made to restore normal operating efficiency. The subject is presented in four divisions, each of which is divided to deal with the different components or assemblies of the engine.

A sectional view of a typical six-cylinder engine is shown on pages 32 and 33, on which the principal components are identified, so that these and their relation may be understood by one not mechanically experienced.

On the chart are other sectional views of types of engines in general use, and in the article appears a brief description of each. The first engine described is in the upper left corner and the order is clockwise, following the page margin and encircling the chart.

The main chart shows an L-head engine, the valves being in pockets at one side of the block, but other illustrations show the I or valve in the head types, and horizontal valves, which are typical of the Duesenberg engine. The engines may have either the heads cast integral with the cylinder blocks, or the heads may be separate units. The valves may be L-type or T-type, or located in the head. Valve-in-the-head engines usually are constructed with the valves operated by rocker arms and long push rods actuated by camshafts enclosed in the crankcase, but overhead camshafts have been used in some engines.

The engine designers generally favor a separable head construction because this minimizes maintenance labor, such as cleaning the combustion chambers, and piston and grinding valves, and the pistons can be more conveniently removed. The cylinders are generally cast in units or pairs or threes, or en bloc, for rigidity and permanent alignment are especially desirable, and the single unit is, as a rule, shorter and requires less space and a crankshaft of minimum length, which is of prime importance when reduction of vibratory stresses and whipping are desirable.

Referring to these different types, the first in the order stated is a sectional view of a Studebaker four-cylinder, L-head engine with the head integral with the cylinder block. The valve mechanism is enclosed by a plate at the side and the valves may be removed by taking off this plate and removing the valve caps. The main and crankpin bearings are reached for inspection or adjustment by removing the lower section of the crankcase.

The connecting rod caps are secured by four bolts each, this insuring rigidity and security and the cams are forged in-

tegral with the camshaft. The gears of the timing gearset are spur type. These are reached by removing the cover plate of the gear case. The pistons are fitted with four rings each, three above and one below the wristpins. The wristpins are secured in the piston bosses by hexagon-headed screws that are seated in threaded bores extending through the wristpin walls that are retained by cotter pins. The pistons and connecting rods are removable after the lower section of the crankcase has been taken off.

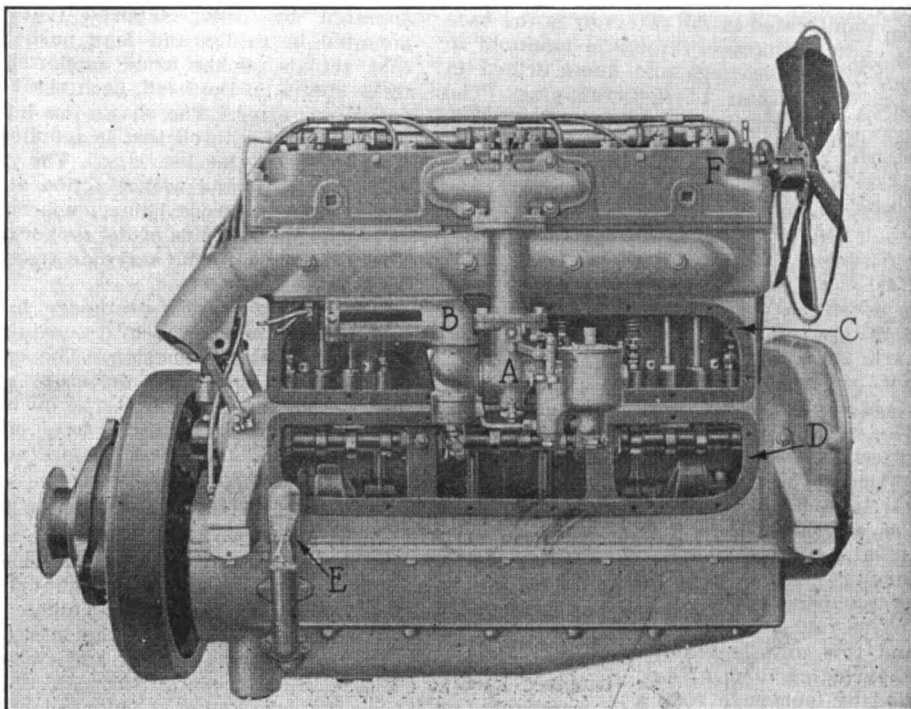
Lycoming Four-Cylinder Engine.

The engine next to be considered is a Lycoming, the type used in Dort cars. The cylinders are cast en bloc and the head is removable. The construction is an L-

gears are helical cut, three teeth being constantly in mesh, which insures noiselessness and endurance. The oil troughs in the base of the crank chamber may be adjusted as to height when the engine is assembled to obtain any desired depth of lubricant. The troughs are supplied with oil by a pump driven by the camshaft.

Marmon Six-Cylinder Engine.

The engine next in specified order is a Marmon six-cylinder, valve-in-the-head type with separable head. The cylinders are cast in sets of three and when assembled with the one-piece head these have practically the rigidity of the en bloc construction. The crankcase is constructed in two sections. The pistons



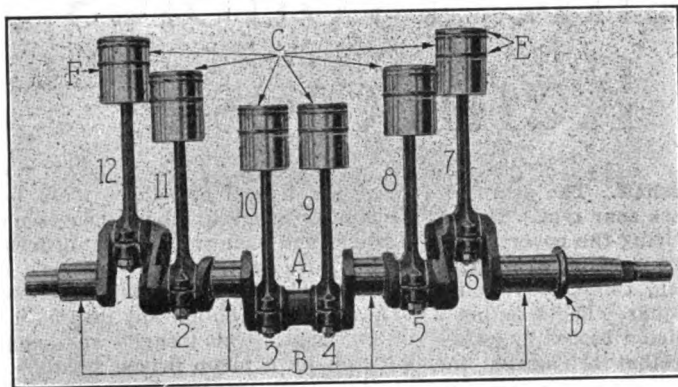
Power Plant of 1920 Reo Six: A, Rayfield Float Feed, Automatic Type Carburetor; B, Adjustable Hot Air Intake to Carburetor; C, Removable Dust Cover Over Valve Mechanism; D, Removable Plate at Side of Engine Base Allowing Adjustment of Bearings; E, Oil Gauge; F, Removable Head. Note Accessibility of Power Plant.

head and the valves are exposed by the removal of the head, the operating mechanism being enclosed by a plate retained by studs and wing nuts. The valve tappets are adjustable with screws and lock nuts.

The pistons are fitted with three rings, all above the wristpins. The connecting rod caps are each retained by two bolts, and the caps are fitted with dippers for distributing the lubricant in the crankcase by splash. The main and crankpin bearings are reached by taking off the lower section of the crankcase. The wristpins are retained as are those of the Studebaker engine, by screws seated in the piston bosses extending through the wristpin walls. The timing gearset

are composite, having aluminum heads and cast iron skirts that are assembled with four longitudinal bolts each. The wristpins are secured in the piston bosses by two cap screws each, that are seated in threaded bores in the piston bosses and extend through the walls of the wristpins.

The crankshaft is a three-journal type fitted with counterweights, and the camshaft is forged with the cams integral. The valves are in the head and are operated by rocker arms that are mounted on individual studs, being supported by large bronze bushings. The arms are adjustable by nuts supporting the bushings and the adjustment may be made while the engine is running. The valves are



Crankshaft Assembly of Reo Six 1920—A, Crankshaft; B, Main Bearings; C, Pistons; D, Oil Retaining Ring; E, Piston Rings; F, Oil Groove; 1, 2, 3, 4, 5, 6, Connecting Rod Bearings; 7, 8, 9, 10, 11, 12, Connecting Rods.

reached for grinding by removing the head and inverting it. The pistons may be removed after the head and the connecting rod caps have been taken off.

The engine is lubricated by a forced system, being circulated by a gear pump located in the reservoir in the base of the crankcase, through a manifold to the main bearings and ducts drilled in the crankshaft to the crankpins. The system is regulated by a vacuum control, which is patented, by which the flow of oil is increased or diminished with the speed of the engine.

Nash Six-Cylinder Engine.

The next engine in stated order is the Nash, a six-cylinder valve-in-the-head type with a separable head. The cylinders are cast en bloc and all moving parts are enclosed. The spark plugs are not covered. The pistons have three rings each, fitted above the wristpins. The wristpins are secured by cap screws threaded into the piston bosses and pinned to the crankshaft. The crankshaft is a three-journal type, fitted with counterweights and the camshaft is mounted on three bearings. The timing gearset is accessible by removing the cover of the gear case.

The valves are mounted and inverted and this unit is removed for grinding them. The valves are operated by long push rods actuated by tappets, by rocker arms that are mounted on two shafts, each supported by brackets, on the head unit. The relations of the rocker arms on the shafts are maintained by springs between them. The valve tappets are mounted in three sets, bridges, each of which carries three that are secured to the engine crankcase at the ends.

The Delco generator and the fan unit assembly that is mounted on the forward end of the engine block are driven by a V belt from a pulley on the crankshaft. The distributor for the ignition current is located at the center of the cylinder block in the crankcase and it is driven by a vertical shaft by worm gears from the camshaft. The lubricating system is a force feed type, the pump being in the reservoir in the base of the crankcase and driven by worm gears by the camshaft.

Buick Six-Cylinder Engine.

The fifth engine to be taken up is a Buick six-cylinder valve-in-the-head

type with the cylinders cast en bloc, with a separable head. The pistons are fitted with four rings each, three above and one below the wristpin. The wristpins are secured in the piston bosses by cap screws seated in threaded bores in the bosses that extend through the wristpin walls and are retained with cotter pins. The crankshaft is a three-journal type and the camshaft is drop

forged with cams integral and is mounted on three bearings. The connecting rod caps are retained by two bolts each.

The valves are mounted in cages in the removable head and these cages are removable for grinding. The valves are operated by roller tappets that are mounted in guides and long push rods that actuate rocker arms supported on three shafts on the head, each shaft carrying four arms. The shafts are hollow and are filled with oil that is supplied by wick feed to the bearings. The push rods have ball and socket action at the upper ends, the rods being mushroomed to retain the ball ends of the rocker arms and these mushrooms serve as traps for lubricant.

The timing gearset gears are helical cut and are accessible by removing the cover plate of the housing. The engine is lubricated by a pump driven by worm gears from the camshaft. The oil is circulated to troughs in the base of the crankcase and these troughs are adjustable as to height.

Knight Sleeve Valve Engine.

The next two engines in the series are the Knight sleeve valve, these being a four-cylinder and the eight-cylinder type known as the Willys-Knight. The cylinders are I-head and the intake and exhaust ports are opened and closed by sliding sleeves concentric with the pistons that are actuated independently by an eccentric shaft. The crankshaft, pis-

tons and connecting rods and wristpins follow conventional practice, but the eccentric shaft replaces the usual crankshaft. The pistons are fitted with three rings each above the wristpin and there are three oil grooves in the piston skirt. The outer sleeves are grooved and drilled to distribute oil. The heads of the cylinders are removable. The pistons and connecting rods may be taken out at the tops or at the bases of the cylinders, according to the condition. The engines are lubricated by a combination pressure feed and splash, the oil trough into which the connecting rods swing being raised and lowered to vary the distribution to the speed of the engine. The oil pumps are operated by worm gears and are driven by the camshafts.

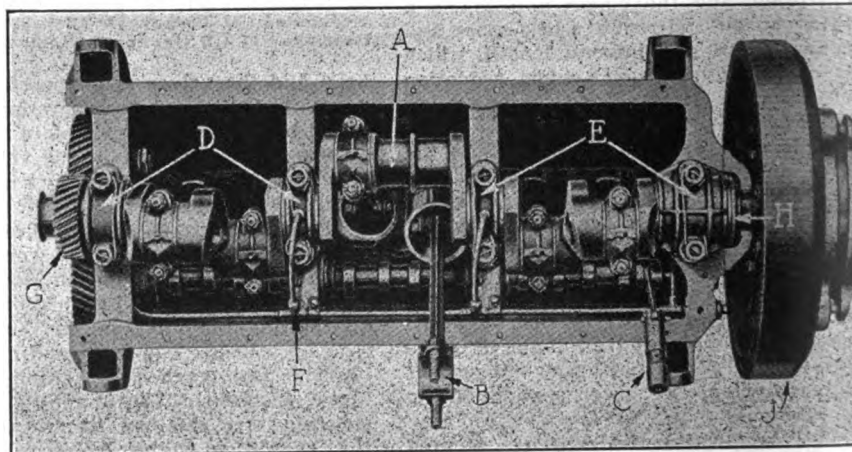
Case Four-Cylinder Engine.

The next engine to be considered is the Case four-cylinder, L-head construction with cylinders cast en bloc. The head is a separate unit. The valves are accessible for grinding by removing the head and the pistons may be taken out at the tops of the cylinders after taking off the crankpin caps. The pistons are fitted with three rings each and have grooves above and below the wristpin. The crankshaft and camshaft are of the journal construction, the latter having the cams forged integral. The connecting rod caps are secured with four bolts each. The wristpins are clamped in the connecting rods and oscillate in the piston bosses. The bearings of the fan shaft are a cup and cone annular type. The engine is lubricated by pressure forced by a plunger pump that is actuated by an eccentric on the camshaft.

Duesenberg Four-Cylinder Engine.

The engine next in order of illustration is a Duesenberg 4-cylinder, which differs mainly from conventional practice in its valve design. The valves are placed horizontally in the side of the cylinder block and these are actuated by a series of lever arms that are fulcrumed on a shaft that parallels the crankshaft, and operated by a camshaft. The valves are the poppet type and are closed by spring pressure. The valves and valve guides and shaft are enclosed by a large housing on the side of the engine block.

The cylinders are cast en bloc and



Engine Base of Reo Six Showing Location of Principal Parts—A, Crankshaft; B, Connecting Bearing Cap Disassembled; C, Oil Pump Plunger; D, E, Main Bearing Ducts; F, Oil Tube; G, Helical Cut Timing Gears; H, Rear Main Bearing Oil Ring; J, Flywheel.

pistons are the standard construction. The pistons are removable through the bases of the cylinder by removing the lower section of the crankcase and the crankpin caps. The fan is mounted above the timing gearset case and is driven by a belt from a pulley on the crankshaft.

Packard Twin-Six Engine.

The engine seen in last two illustrations is the Packard Twin-Six, which is shown in side and end sectional view. The cylinders are cast in units of six each and are installed on a common crankcase at an angle of 90 degrees. The cylinders are the L-head type and the heads are separate units. The pistons are fitted with three rings each. The crankshaft is a three-journal type and is counter-weighted. The camshaft is three-journal and the cams are forged integral. The connecting rods are fitted to the crankpins in pairs. The camshaft is mounted between the cylinder blocks and is driven by a silent chain. The camshaft drives the oil pump and the distributor through sets of worm gearing. The valves are accessible for grinding by removing the heads of the blocks and the plates enclosing the valve operating mechanism, and the pistons may be removed from the cylinders when the crankpin caps have been taken off.

Use of the Engine Chart.

The chart is intended to be a reference by which the components of an engine can be identified. Accompanying this is a list of the probable results from use that will identify a condition, specify the cause and briefly state the means of restoration. There is one fact that an owner or driver should realize, and that is the necessity of determining the cause of engine failure. This may necessitate a series of tests and become practically a process of elimination.

One should understand that experiment that necessitates changes of adjustment is not advised. There may be several conditions that should receive attention, but as a rule there will be but one main cause for failure, and when this has been determined and the engine is

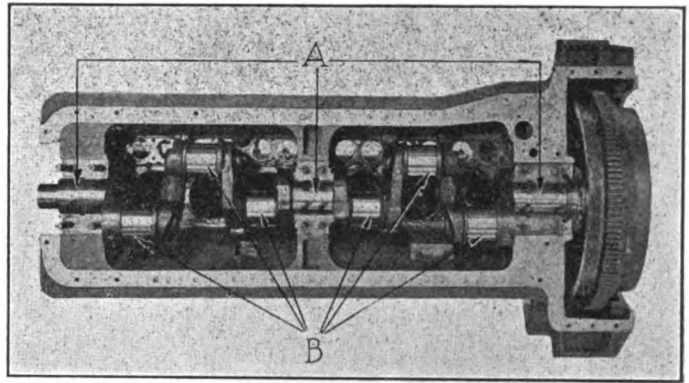
operative other necessary work may be done. The term failure does not necessarily mean that an engine cannot be started, but should be applied when there is loss of power, noise, overheating, etc.

When a condition obtains that can be identified readily and examination establishes that this conclusion is correct, restoration should be made without changing the relations of other components. When there is uncertainty the list will suggest conditions and inspection can be made systematically until the cause has been learned.

The enumeration of the conditions, causes and restorations is sufficient for those who have mechanical knowledge or who lack experience to determine whether or not they can undertake the work. There are some repairs that can only be made by specialists, who have tools and facilities, while there are others that can be attempted with the average tool kit with reasonable assurance of good results.

Engine Overheating.

Engines may heat excessively from any one or a combination of causes. The average car is usually fitted with a radiator that will diffuse the heat resulting from any normal use, but if the volume of water passing through it is reduced or the velocity of the air current through it is lessened, this temperature of the water will increase until it is boiled. Driving for a considerable period at low gear ratio, or at slow vehicle speed, or if the fan belt slips, the air current will be much reduced. As the direct radiation from the engine is expected to diffuse practically as much heat as the water circulation through the radiator, one will understand why the air current



Bearing Assembly of National Sextet Power Plant—A, Three Main Bearings; B, Six Connecting Rod Bearings on Crankshaft.

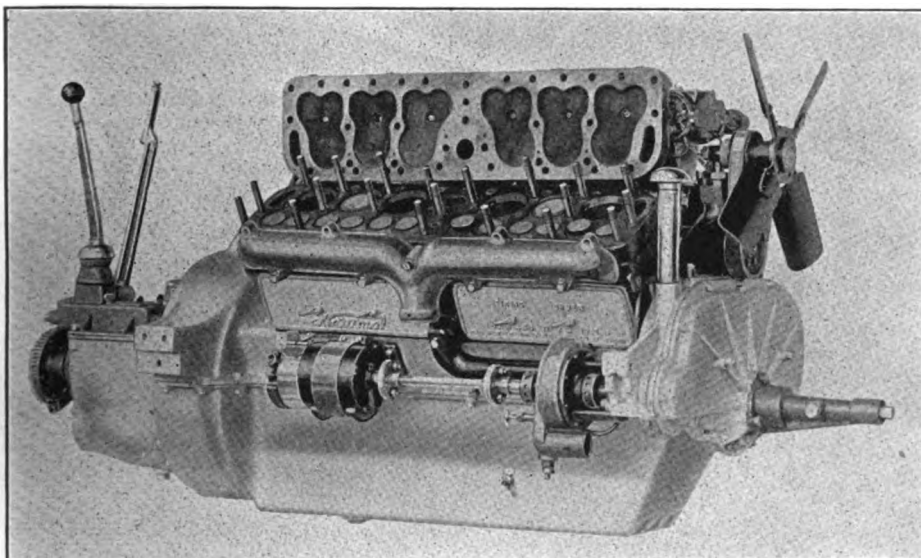
is a very potent factor, and the fan belt should always have such tension that it will be driven at maximum speed.

What has been stated with reference to the air current applies equally well to the water circulation, for both water and air moving at maximum, are necessary to cool the engine. The movement of the water through the cylinder jacket may be obstructed by scale or sediment (in some instances by core wires or sand not removed when the casting was cleaned at the foundry); by scale or sediment lodged in the water passages of the radiator; by the constriction of the bores of the rubber hose connections (the rubber and fabric will be rotted and ruptured from action of the hot water or elements it contains in solution, such as glycerine or oil); by the breaking of a pump impeller blade or the shearing of the pin or key retaining the impeller on the pump shaft. If the water is low in the radiator the engine will overheat, but replenishment of the water is sufficient restoration.

Other causes are as follows: Too late ignition, with which is excessive consumption of fuel; combustion causing excessive heat; too lean or too rich a fuel; carbon deposits in the cylinders; valves opening too late; too small a radiator; frozen radiator; clogged muffler; inadequate lubrication or fan blades bent. Another cause that may obtain directly after an overhaul is too tight main or crankpin bearings, which will result in excessive friction.

The valve setting should always be what was determined by the designer. As the engine is used the ports and valves will wear and the ends of the valve stems will flatten or shorten. Generally there are means of adjustment on the tappets or the push rods, and adjustment must be made. Shortening the valve stems will reduce the time the valves are open and lessen the clearance, and the valves will open late.

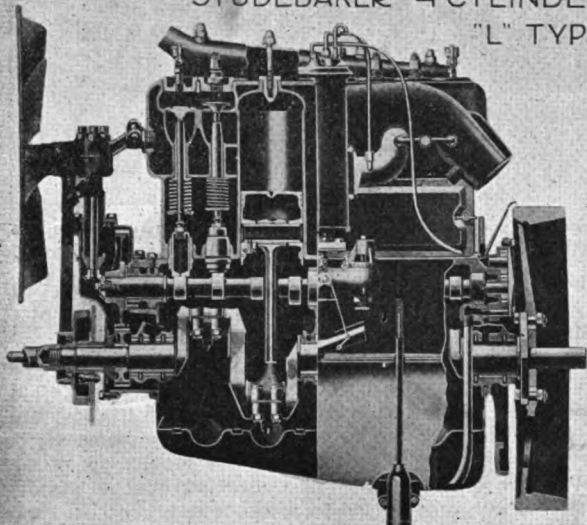
Practically all camshafts are made with the cams integral and if a valve of any one cylinder, preferably the exhaust valve of No. 1 cylinder, is set, all of the valves should be timed accurately, but the valves must be adjusted individually for clearance, which should be from .003 to .005 inch, when the engine is heated. A piece of newspaper ought to be a reasonably accurate gauge for maximum clearance when placed between the stem end and the tappet or push rod.



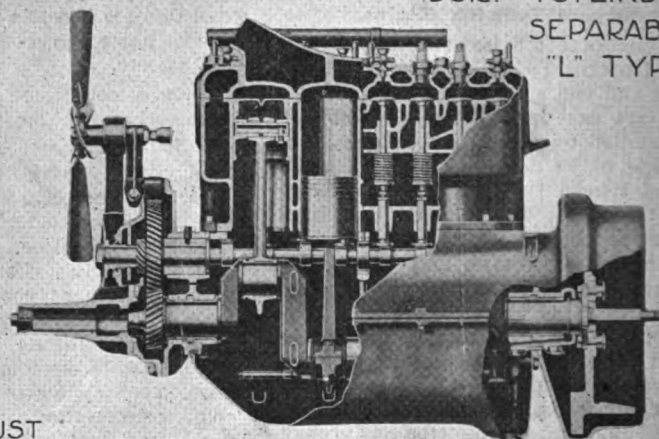
Power Plant of National Sextet. Rugged Construction, Accessibility and Smooth Flow of Power Are Strong Features of This Engine.

Sectional Views of Typical Automobile P

STUDEBAKER 4 CYLINDER
"L" TYPE

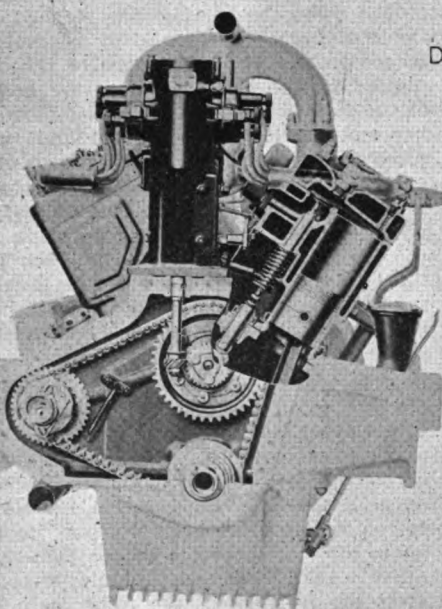


DORT 4 CYLINDER
SEPARABLE
"L" TYPE

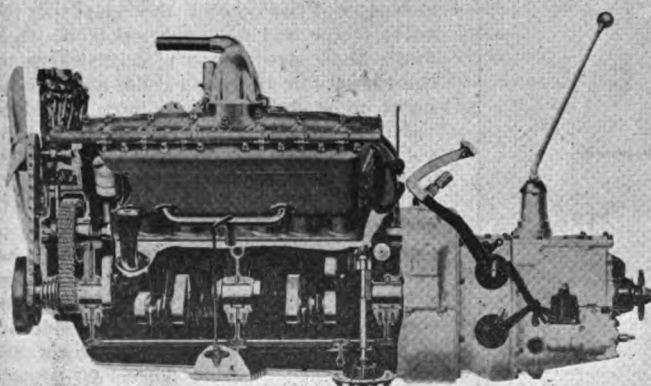


- EXHAUST MANIFOLD
INTAKE MANIFOLD
FAN ADJUSTING SCREW
DISTRIBUTOR
FAN BLADE
FAN HUB
VALVE DUST COVER
OIL FILLER COVER
TIMING GEAR CASE
DISTRIBUTOR SHAFT
DISTRIBUTOR SHAFT BEVEL GEARS
CAMSHAFT GEAR
CAMSHAFT FRONT BEARING
CRANKSHAFT GEAR
STARTER CLUTCH & SPROCKET
NO. 1 MAIN BEARING
CONNECTING ROD
CONNECTING ROD BOLT NUT & CAP
CONNECTING ROD CAP OIL DIP
CAMSHAFT CENTER BEARING
- WRISTPIN CLAMPING BOLT
WRISTPIN BUSHING
CYLINDER WATER JACKET
CAMS
CAMSHAFT
WRIST
- MAZ
6 CYLIN
"I" TY
SEPARA
HEA
COMBUSTO
CHAMBER
PISTON
BOSSES
- NO. 2 MAIN BEARING
NO. 2-3 MAIN BEARING SUPPORTS

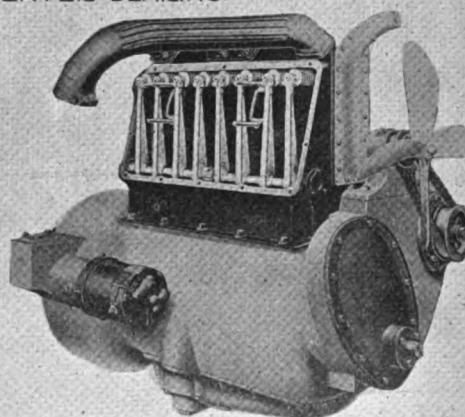
PACKARD 12 CYLINDER
SEPARABLE "L" TYPE



PACKARD 12 CYLINDER
SEPARABLE "L" TYPE



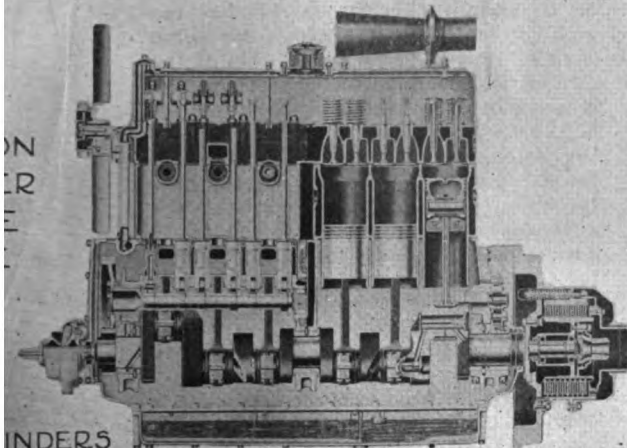
DUESENBERG
4 CYLINDER
HORIZONTAL TYPE VALVES



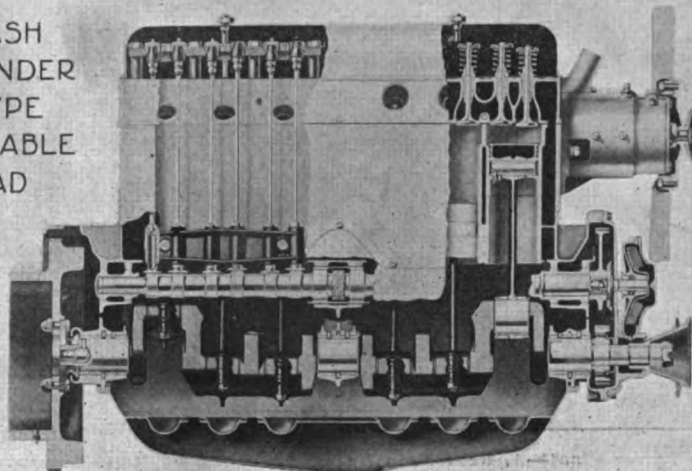
CASE 4 CYLINDER
SEPARABLE "L" T



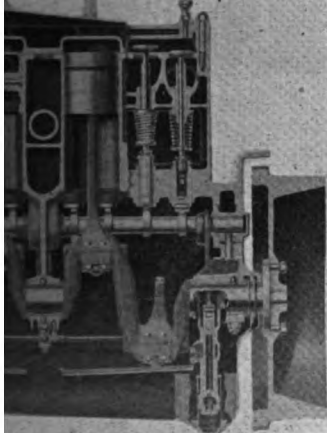
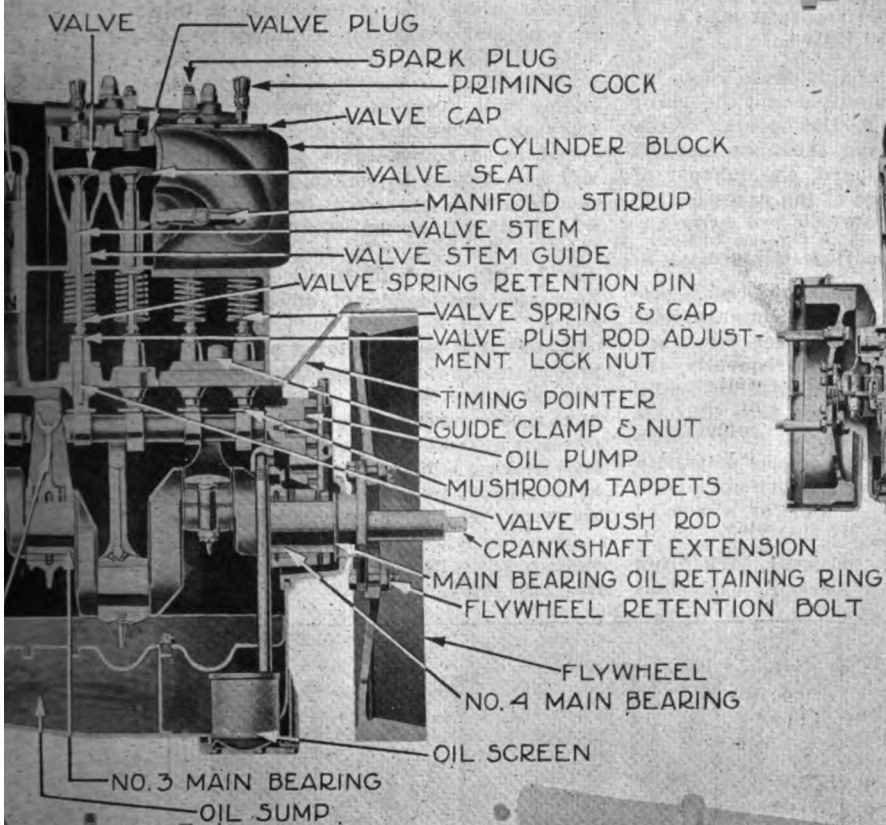
Power Plants with Units Clearly Indicated



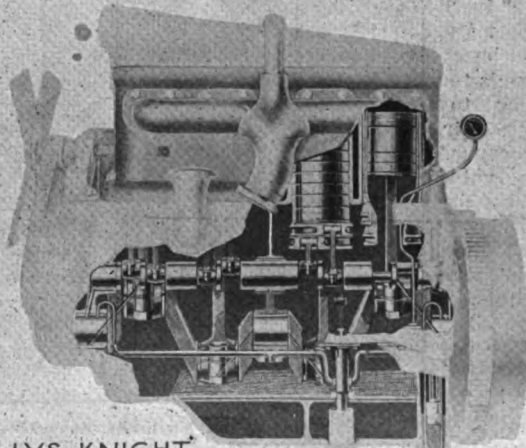
NASH
6 CYLINDER
"I" TYPE
SEPARABLE
HEAD



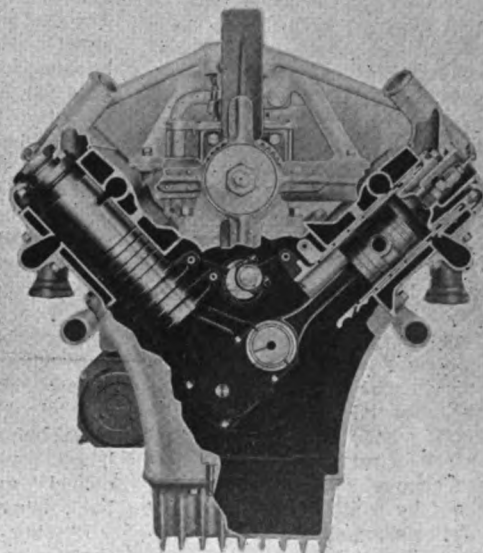
BUICK 6 CYLINDER "I" TYPE
CAGED VALVES

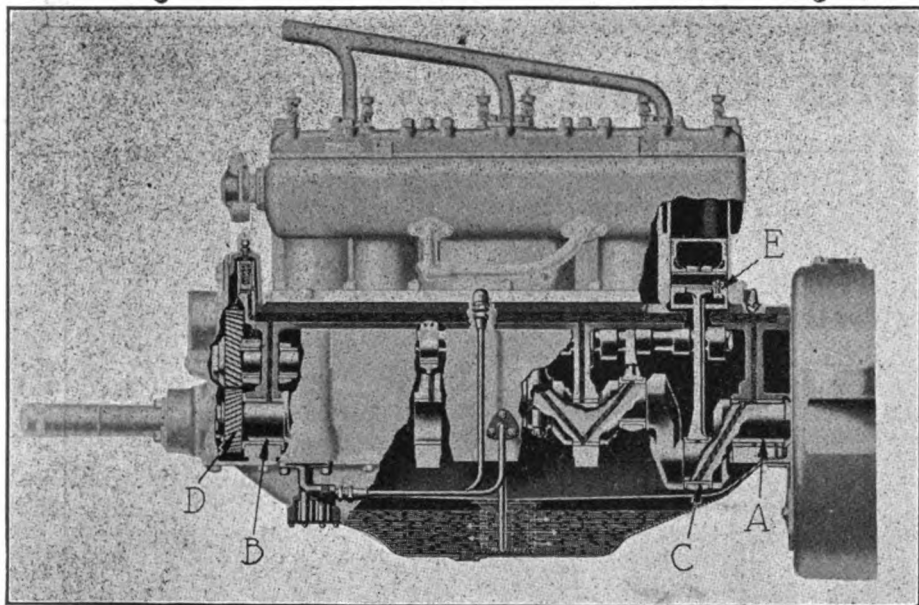


WILLYS-KNIGHT
4 CYLINDER SLEEVE VALVES



WILLYS-KNIGHT 8 CYLINDER
SLEEVE VALVES





1920 Velle Power Plant—A, Rear Main Bearings; B, Front Main Bearing; C, No. 6 Connecting Rod Bearing and Oil Duct from Force Feed Oiling System; D, Helical Cut Timing Gears; E, Set Screw Fastening Wristpin in Piston.

If the camshaft has been removed from the engine block care should be taken to replace it as it was originally. This may be done by positioning the flywheel with reference to the indicator, which will show the point at which the intake valve of the No. 1 cylinder will open and the exhaust valve of the same cylinder will close. Usually if these are correct the other valves will be correctly timed.

In the event that no marks are shown on the flywheel the position of the piston with reference to top center for the exhaust valve can be determined by sounding the cylinder through the spark plug bore or the valve cap, and by noting the position of the valve being tested one can determine approximately whether or not the setting is accurate.

The adjustment of valves as to clearance must be made with the adjusting screws and nuts on the tappets, and by the adjusting nuts on the push rods. The principle is practically the same with all L or T-type head engines, the latter class having two camshafts instead of one. Valve-in-the-head engines usually have a single camshaft. The V-type engines usually have one camshaft, but the number of cams differ. The Cadillac eight-cylinder engine has eight cams for 16 valves, while the Cole and King eight-cylinder engines have 16-cam camshafts. The Packard Twin-Six engine has a separate cam for each cylinder on one camshaft, while the National Sixtett has two camshafts, with a cam for each valve.

With reference to the Knight engine, the two eccentric sleeves are slidable between the piston and the cylinder walls, these being independently operated by small connecting rods that are actuated by an eccentric or small crankshaft that parallels the crankshaft. The eccentric shaft is driven by a silent chain at half the speed of the crankshaft. The eccentric pin operating the inner sleeve is given a lead over the pin operating the outer sleeve. This causes alternating action of the sleeves, and slots in the sleeves register with ports in the cylin-

der walls, and through these slots or ports the fuel is admitted and the burnt gases exhausted. As the opening of the ports is positive and the area may be practically proportioned, the inhaust of fuel and the exhaust of the gases is free and unobstructed.

Effect of Too Rich Mixture.

The fuel that contains too great a proportion of gasoline causes intense heat and is not wholly consumed when exhaust is begun. Not infrequently the fuel will be so rich that it will not ignite and the cylinder will not fire. Besides overheating and missing a black smoke will be exhausted. The cause may be a sticking spring in an auxiliary air intake, an obstructed air opening or a flooded carburetor.

If the mixture is too weak back firing through the carburetor and explosions through the muffler may be noted. The fuel will burn so slowly that it is burning when the intake valve is opened and the fresh fuel will be fired and will flash from the manifold to the carburetor. The cause is too little fuel or too much auxiliary air. Back firing caused by a weak valve spring is usually more violent. An intake valve inaccurately timed may open before the exhaust valve has closed and cause back firing.

Driving with the ignition set late will cause combustion when the piston is moving downward, so that much of the

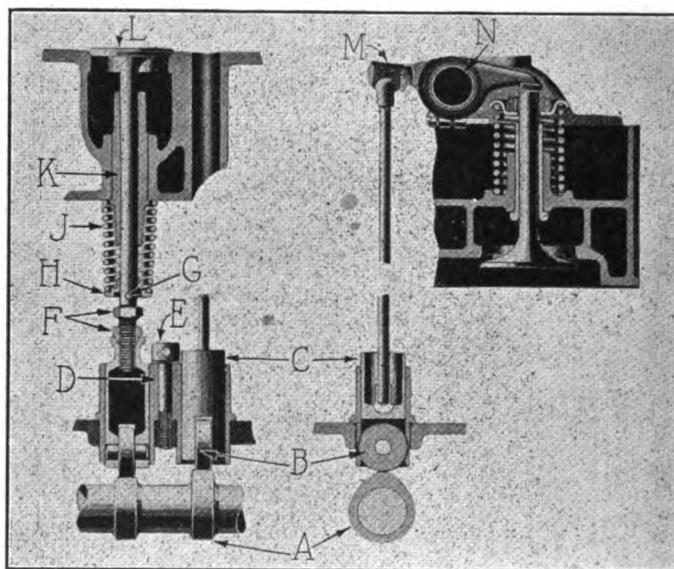
expansive force is lost, and the mixture will burn during much if not all of the exhaust stroke. To obtain power more fuel is supplied and this is practically wasted, for some of it is not consumed.

The ignition spark should be created before the piston has reached top center on its compression stroke, so that the greatest effect of the expansive force shall be first in the smallest area of the combustion chamber, which means the creation of power, and second so that all of the force shall be exerted to actuate the piston, and entirely consumed before the exhaust valve is opened. The higher the speed of the engine the greater the advance, and a lead of as much as 30 degrees is not unusual in racing engines, for the lag of the electric current must be provided for and combustion must be begun so that the maximum expansive force will be directed upon piston to give it the greatest possible impulse.

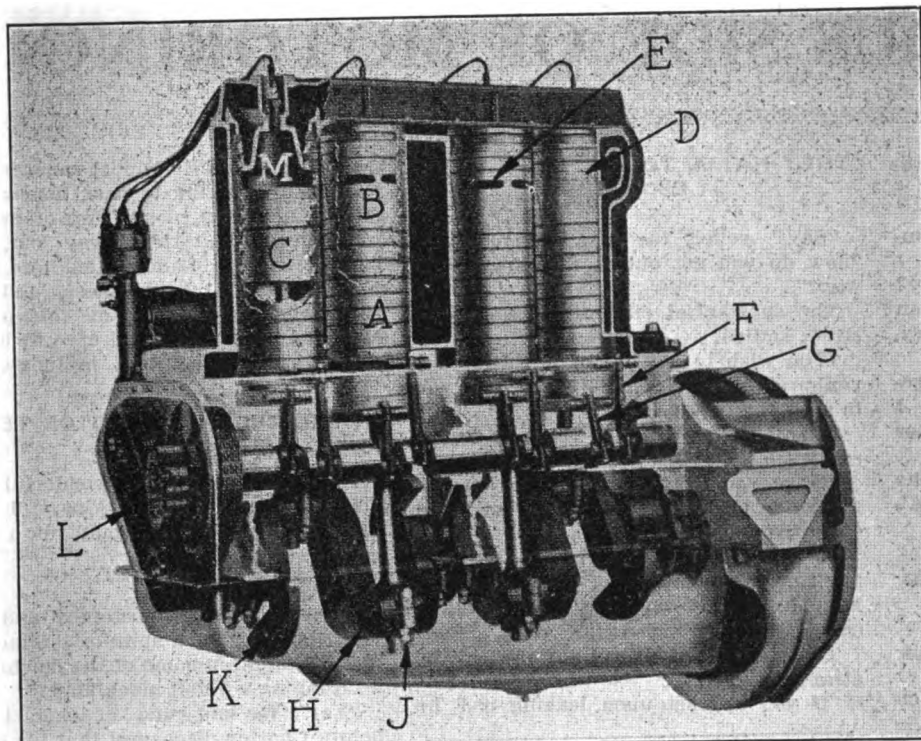
Overheating from Lack of Lubricant.

When the lubricant is extremely low and the volume supplied to the moving parts and distributed by splash is less than normal, or the oil is diluted by admixture of oil taken into the cylinders with the fuel, or the oil is too light, the engine will overheat. There are times after an engine has been driven at top speed for a considerable period that it will lose power, but when it has cooled somewhat the power will improve and it will function to normal standard. This is because the cooling system and the radiation will not sufficiently reduce the heat and the supply of oil is not adequate.

If the oil is low or diluted or too light, practically the same condition will obtain at lower speeds. If the bearings have been recently tightened, or new piston rings fitted, there may be excessive friction, which can only be improved by continued use, when the engine will "limber." The light oil will lubricate effectively provided it is supplied in larger volume, but a heavier oil will more satisfactorily serve.



Valve Mechanism of National Sixtett—A, Camshaft and Cams; B, Roller Tappets; C, Tappet Guide; D, Guide Clamp; E, Guide Clamp Bolt; F, Tappet Adjustment; G, Valve Spring Cap Retaining Pin; H, Valve Spring Cap; J, Valve Spring; K, Valve Stem and Guide; L, Valve; M, Rocker Arm Ball and Socket Joint; N, Rocker Arm Bearing.



Phantom View of Stearns-Knight Power Plant—A, Outer Sleeve; B, Inner Sleeve; C, Piston; D, Port Opening in Sleeves Closed; E, Port Opening in Sleeves Open; F, Connecting Rod Operating Outer Sleeve; G, Connecting Rod Operating Inner Sleeve; H, Crankshaft; J, Connecting Rod Bearing; K, Counterweight; L, Silent Chain, Driving Eccentric Shaft and Pump Shaft from Crankshaft Gear; M, Combustion Chamber.

Air-cooled engines require a heavier oil than water cooled engines from the fact that the temperatures are usually higher and the lubricant must resist a greater degree of heat. The oil itself is heated by contact with the pistons and cylinder walls and it is not infrequently from 300 to 400 degrees, and at such temperatures radiates heat slowly. It becomes more fluid as heated and whatever passes the pistons and is carried into the combustion chamber is in part consumed. Theoretically all this oil should burn, but mixed with metallic particles, dust inhaled with the fuel, more or less residuum remains that is known as "carbon."

When the engines are the heavy duty types the crankcases are cast with longitudinal ribs that radiate the heat. These ribs have been found reasonably effective. When an engine is driven the oil is distributed all over the interior of the crankcase and cylinders and pistons and drains to the reservoir. When the oil is low the system if splash, is reduced in efficiency, but if the lubricant is supplied by a pump there should be no diminution in volume until the reservoir is exhausted.

If the oil is low or diluted there is possibility of the bearings being heated so that they will become plastic, and they will be deformed under heavy pressure. The pistons may expand so that they will seize in the cylinders and the rings may be broken. These are some of the results from overheating. The greatest safety is regular replenishment of oil. The reservoir should be kept as near the normal level as is possible. The dash or sight gauge should be observed to determine whether the lubricant is circulating, and inspection should be frequent to know that the pump is drawing oil.

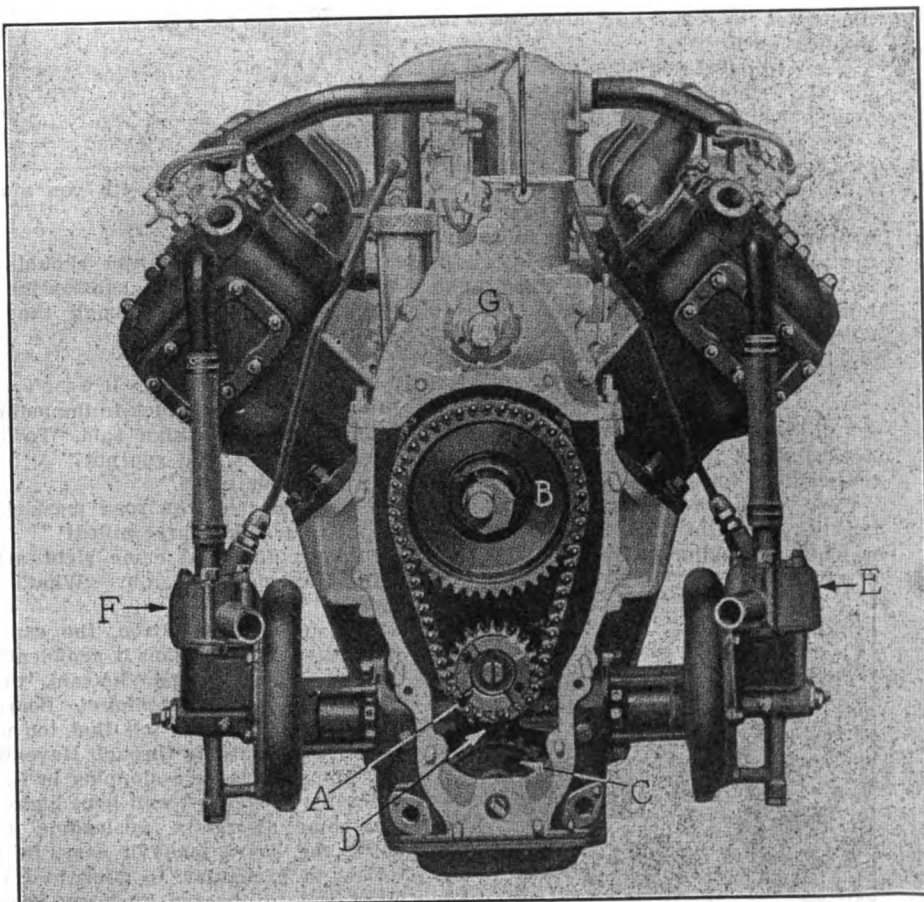
The oil reservoir should be drained according to the recommendation of the manufacturer, and flushed with kerosene

or gasoline to remove the sediment. With no stated mileage for crankcase drainage one can safely assume 250 miles when an engine is new, next after 500 miles and after that every 1500 miles. The oil should always be filled to the level prescribed. Use light oil and an excess volume for a new car, and after 750 miles one can assume safely that the engine has reached its maximum efficiency. Then follow the manufacturer's instructions carefully.

Do not assume that because a certain quality of oil has been placed in an oil reservoir that the oil in the engine case is safe to use. If it is thin you may suspect it has been diluted by kerosene from the fuel, drawn through the carburetor, leaking past the pistons. There may be considerable sediment in it, and this may be sufficiently abrasive to damage the bearings and the cylinder walls. Oil taken from an engine case may be filtered and used for other purposes. It is not necessarily wasted.

Care of the Water Cooling System.

The water cooling system of an engine is expected to diffuse approximately 36 per cent. of the heat originating from the fuel consumed, and the water is expected to absorb the heat from the cylinders and reduce the temperature while passing through a radiator. The radiator is designed to have specific cooling efficiency and so long as the water is not obstructed and the air current has normal velocity, the radiator will meet expectations. But the water chambers of the



Power Plant of Cadillac Eight 1920, Front View with Cover Removed Showing Camshaft Driving Chain; A, Crankshaft; B, Camshaft Gear; C, Oil Pump Driven by Worm Gears from Crankshaft; D, Worm Gear on Water Pump Shaft Driven from Crankshaft; E and F, Water Pumps, Thermostats and Control Valves; G, Fan Generator and Distributor Shaft.

HUMOROUS SIDE OF MOTORING

STARTLING ANSWERS TO QUESTIONS IN AUTO EXAMINATION.

Here are some of the questions and answers at a Denver auto examination:

Q.—What is the speed limit in the city? In the country? A.—Not over 40 miles an hour in the city. Slower in the country, because the roads are bad.

Q.—If your brakes failed to work going down hill, what would you do? A.—I would jump out and throw a rock under the wheels.

Q.—Which side of a car going in the same direction must you pass? A.—Always pass on the safest side.

Q.—What would you do if the steering gear broke? A.—Drive to the nearest garage and have the man fix it.

Q.—If your engine stalled on a car track, what would you do? A.—Telephone my husband to come and fix it.

Q.—When the car is standing, which side should be next to the curbing? A.—The side nearest the sidewalk.

Q.—What precaution should be taken in backing your car? A.—Reverse the engine.

Q.—What is the accelerator? A.—A thing that has something to do with something inside the car, when you step on it, or something.

Q.—When the batteries run out, what must you do? A.—Run after them or get new ones.

Q.—Why must you keep grease and oil off the wheels? A.—Because it gets your hands and clothes dirty.

Q.—What is the office of the spark plug? A.—The office of the spark plug is the office where it is made or sold.

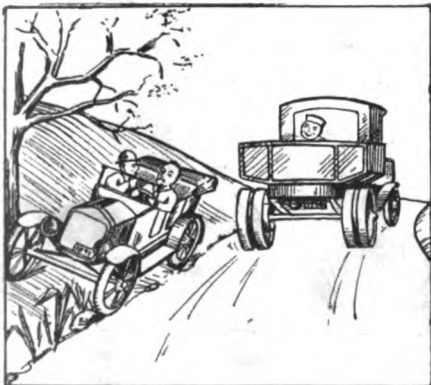
Q.—How far must you stop from a fire hydrant? A.—Far enough not to scratch the varnish.

Q.—If your engine stalls going up a hill, what must you do? A.—Try to start it.

RIGHT VS. MIGHT.

"Why did you turn out for that truck? According to the traffic rules, you had the right of way."

"Yes," answered Mr. Chuggins, patiently. "But the truck had the right of weight."—Washington Star.



THEY HATED TO SEE TRAVELERS ESCAPE.

"Say," yelled the stranger motorist, "how do you get out of this town, anyway?"

The substantial citizen on East Main street smiled.

"You wish to get out of beautiful Havenhurst? Is that what I understand you to say?" he inquired.

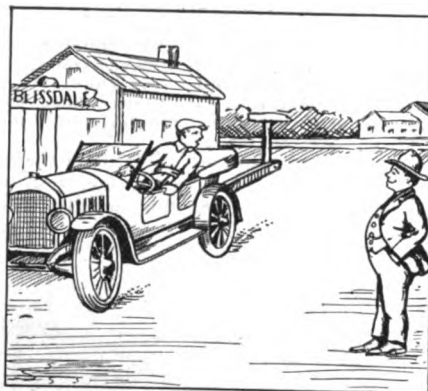
"I do. It was," replied the man in the car.

"Have you followed the directions on the guide posts, the pointing arrows and so forth?"

"I have—four times. And I always fetch up in the middle of your dodblitted Main street. Are your signs wrong, or can't I read? Which is it?"

The substantial citizen approached the stranger's car.

"If you are set upon leaving us," he



said, "let me get in with you and I'll show you the way."

They proceeded.

"This is the road you should have taken," continued the substantial cit.; "this little sidepath through the pine woods."

"But I never noticed it."

"Of course you didn't. It wasn't meant to be noticed. You stuck to the main macadam where the sign said, 'To Blissdale, five miles,' did you not?"

"I did—four times."

"And you took the road marked, 'To County Turnpike, three miles?'"

"I sure did; and came right around into Havenhurst again. What's the idea?"

The substantial citizen, the car having halted, leaned upon it confidentially.

"The idea, my friend," he said, "originated with the Havenhurst Board of Trade. The members felt that too many people were passing through Havenhurst and not enough were stopping in it. By a circular system of well kept highways, and some discreetly misleading guide posts, the board made it easy, for motorists in particular, to stick to Havenhurst and to observe its many beauties and advantages.

"Several of our most prominent resi-

dents came into our midst innocently as motorists, thinking to pass through just as you did. But, despairing of ever being able to find their way out, they bought real estate and settled here. I am in the real estate business, and have some nice properties in this part of Havenhurst if you would care to look at them."—Harry Hamilton, in Judge.

THOSE TECHNICAL MOTOR TERMS.

"Charley is simply wonderful," exclaimed young Mrs. Torkins. "I never dreamed that any one could run a motor car the way he can!"

"What has happened?"

"We took a ride yesterday and went along beautifully in spite of the fact that he had forgotten some of the machinery."

"Running without machinery?"

"Yes. We had gone at least 11 miles before Charley discovered that his engine was missing."—San Francisco Chronicle.

RESOURCEFUL WOMAN.

Artist—That clumsy girl has flicked a dust cloth across the fresh paint of my new picture. It is nothing but a smear.

His Wife—Never mind, dear. Call it a country scene viewed from a speeding automobile.—Louisville Courier-Journal.

AS SHE REMEMBERED IT.

He—Got your eye on a car, eh? What make is it?"

She—An F. O. B. Detroit, I think the salesman called it.—Boston Transcript.

AGAINST THE RULES.

A clergyman, about to enter a 'bus, noticed a gentleman seated in the corner who had celebrated peace rather too well.

"Do you allow drunkards in your 'bus?" he asked the conductor.

"Well, not as a rule," said the conductor, "but slip in quietly."—Boston Globe.



Names and Models of Passenger Cars for 1920 Classified According to Prices

\$500 TO \$1000.					2 Pas. 5 Pas. 7 Pas. Sedan					2 Pas. 5 Pas. 7 Pas. Sedan				
Model	2 Pas.	5 Pas.	7 Pas.	Sedan	Model	2 Pas.	5 Pas.	7 Pas.	Sedan	Model	2 Pas.	5 Pas.	7 Pas.	Sedan
Price	Price	Price	Price	Price	Price	Price	Price	Price	Price	Price	Price	Price	Price	Price
BRISCOE					ELCAR					STEARNS				
B4-24	\$985	\$985			D. F.				1775	SKL4	†2250	2250	2475	
CHEVROLET					ELGIN				1995	STEPHENS				
490	715	735			H				1950	Sallent Six			*2050	
DORT					ESSEX					STUDEBAKER				
11	985	985			A	1595	1595			EG-60			2135	
FORD					GRANT					VELIE				
T	500	525		\$875	G				1645	48				2385
HARROUN					HANSON			1685		WESTCOTT				
A1		995			HOLLIER					B-38	2090	2090		
MAXWELL					206-B		1985			\$2500 TO \$3000.				
25	985	985			KLINE KAR					AMERICAN				
MOORE		995			6-55-J	1965	1990	†1990		B				2950
OVERLAND					LEXINGTON					ANDERSON				
4	845	845			R-19		1785	1785		400-A-E				2550
SENECA		990			LIBERTY					APPPERSON				
\$1000 TO \$1500.					10-B	1695	†1785	1695		8-20	2950	†2950	2950	
ALLEN					MADISON		1550			BIDDLE				
Series 43		1395			MAIBOHM					H		†2750	*2985	
BELL	†1395	1395			B				1995	BUICK				
BUICK					MAXWELL				1655	K-6-49-50				2695
K-6-44-47	1495	1495			25					CHEVROLET				2695
CHAMPION		1495			MITCHELL					490				
CHEVROLET				1185	E-40	†1690	1690			COLE				
490					E-42			1875		870	2750	†2750	2750	
FB	1100	1135			MONITOR			†1575		COLUMBIA				
CLEVELAND	1385	1385			MCON					D-C & CS.				2850
CROW-ELKHART					6		1885			DAVIS				
CE-36	1295	1295	†1355		NASH					51-54				†2565
CE-46	1295		†1355		682			1640		FRANKLIN				
DISPATCH					681-6			†1640		9B	2700	2750	†2750	
G	†1250	†1290			NELSON		1500			HAYNES				
DIXIE FLYER					OAKLAND				1740	45	†2685		2685	
H-S-50		1365			OLDSMOBILE					HOLMES			2900	
DODGE BROS.	1085	1085			45-B		1895	1895		HUDSON				
ELCAR					37-A				1995	Super-6				2900
D. F.		1225	†1225		PAIGE					JORDAN				
		1475	†1475		6-40	†1595	1595			J-60		2675	2675	
ELGIN					PATERSON					KING				
H		1485			6-46		1695	1725		G	2550			
GRANT					PILOT					KISSEL KAR				
G	1495	1495			6-45	†1700	1650			Cust. Built.	2875	2875		2975
HARROUN					REO					KLINE KAR				
A-1	1095				1920	1650	1650			6-55-J				2790
HUPMOBILE					SAYERS			1745		LIBERTY				
R	1450	1450			Six-42					10-B				2595
MAIBOHM					SCRIPPS-BOOTH					MOLINE-KNIGHT				
B		1395			Six-39				1985	G	†2500		2500	
MONITOR	1475				STPHENS					MCON				
MUNROE	1195	1195			Sallent Six	1975	†1975			6-66-19			2750	
NASH					STUDEBAKER					PAIGE				2950
681-6	†1490	†1490			EH-6-50	1685	1685	†1685		6-55				
NORWALK		1165			VELIE		1685	1685		PEERLESS				
OAKLAND					48					56		†2900	2900	
34-B	†1075	1075			WILLYS-KNIGHT					PILOT				
OLDSMOBILE					88-4		1725			6-45				2500
37-A		1395			\$2000 TO \$2500.					PREMIER				
OLYMPIAN					AMERICAN BEAUTY		2000			6-C		†2585	2585	
45	1240	1240			AUBURN					ROAMER				
OVERLAND					6-39-H-K				2475	C-6-54	2650	†2575	2750	
4				1855	BUICK					SAYERS				
SAXON					K-6-44-47				2255	Six-42				2695
Y-18	†1295	1295			CASE					STUDEBAKER				
SCRIPPS-BOOTH					V	2400		2400		EH-6-50				2835
Six-39	†1295	1295			CHALMERS					TEMPLAR				
\$1500 TO \$2000.					6-30					A-445	†2685	2685		
AMERICAN					CLEVELAND				2370	WESTCOTT				
B	1895	1865	1965		COMET				2385	A-48		2590	2590	
ANDERSON					C-53		2150			B-38			†2790	
400-A-E	1675	1675	1750		CROW-ELKHART					WILLYS-KNIGHT				
AUBURN					CE-46				2395	88-4				2750
6-39-H-K	†1695	1695			ESSEX					\$3000 TO \$4000.				
BUICK					A				2250	BIDDLE				
K-6-49-50			1785		HUDSON					H	3150			
CHALMERS					Super-6		†2200	2100		CADILLAC				
6-30	1685	1685	1765		HUPMOBILE					57	3400	†3490	3490	
CHAMPION		1695			R				2185	CASE				
CHANDLER	†1795		1795		JONES					V				3200
CHEVROLET					28	2250	2250	2250	†2250	COLE				
F B				1685	KING					870				3995
D		1585			G			2350	2150	FRANKLIN				
COLUMBIA					KISSEL KAR					9B				3750
D-C & CS.	†1845	1695			Cust. Built.			2450		HAYNES				
CROW-ELKHART					MOLINE-KNIGHT					45				3550
CE-46		1545			L	†2000	2000			46		†3450	3450	
DAVIS					NASH					HOLMES				3900
51-54	†1795	1765			684				2250	JORDAN				
DODGE BROS.				1750	PAIGE					J-60				3700
DORT					4-55		†2255	2150		KING				
11				1535	REO					G				3100
					1920			2400		LEXINGTON				
										R-19				3200

Model	2 Pas. Price	5 Pas. Price	7 Pas. Price	Sedan Price
MARMON				
34	3950	3900	3950	
MOON				
6-66-19				3850
MURRAY		3500		
NATIONAL SEX-				
TETT	3290	3290	3290	
PEERLESS				
56				3700
REVERE	3850	3850	3850	
ROAMER				
C-6-54				3450
STANDARD				
H	3000	3000	3000	
STANLEY				
Steamer				3889
STEARNS				
SKL4				3300
STUTZ				
G	3250	3250	3350	
TEMPLAR				
A-445				3585
WESTCOTT				
B-38				3190
WINTON				
25	3600	3600	3600	
	\$4000 TO \$5000.			
APPENSON				
8-20				4000

Model	2 Pas. Price	5 Pas. Price	7 Pas. Price	Sedan Price
Model				
Anniversary	4000		4000	
ARGONNE	4500	4750	4750	
BIDDLE				
H				4400
CADILLAC				
57				4450
DANIELS				
C	4250	4250	4250	
D	4500	4500	4500	
DORRIS				
6-80		4350	4350	
HAYNES				
46				4200
MACFARLAN	4300	4450	4300	
MERCER				
Series 4	4500	4450	4450	
NATIONAL SEX-				
TETT				4250
STANDARD				
H				4100
WESTCOTT				
A-48				4190
WINTON				
24	4350	4350	4350	
25				4800
*6-passenger, †4-passenger, ‡3-passenger.				

Model	2 Pas. Price	5 Pas. Price	7 Pas. Price	Sedan Price
\$5000 AND OVER.				
APPERSON				
Anniversary				5500
DANIELS				
C				5750
D				6000
DORRIS				
6-84				5720
LOCOMOBILE				
48	78200		8100	
MARMON				
34				5750
MACFARLAN				5600
OWEN-MAGNETIC				
W-42				5500 6500
PACKARD				
3-35				5550
3-25	15200	5200	5200	
PIERCE-ARROW				
48	7650	7650	7750	
38	7250	7250	7250	
SINGER				
19	5250	5250	5250	7200
STANLEY				
Steamer				5449
WINTON				
24				5600

CALENDAR OF COMING EVENTS

Dec. 19—Detroit, Mich., meeting Society Automotive Engineers, Hotel Ponchartrain.
Dec. 20—Los Angeles, Cal., races, Ascot Speedway.
Dec. 21—York, Pa., annual meeting, Auto Dealers' association.
Dec. 27-Jan. 4—Akron, O., automobile show, Central Garage.
Dec. 29—Los Angeles, Cal., Ascot Speedway race.

1920.

Jan. 3—Chicago, annual meeting, Automotive Wood Wheel Manufacturers' Association.
Jan. 3-10—New York, passenger car show, National Automobile Chamber of Commerce, Grand Central Palace.
Jan. 3-10—New York, exhibition of commercial cars and accessories, Eighth Coast Artillery Armory.
Jan. 6-9—New York City, annual motor conference, Society Automotive Engineers.
Jan. 7-8—New York City, meeting, Society Automotive Engineers.
Jan. 8—New York City, annual meeting, Trailer Manufacturers' Association of America.
Jan. 8-15—Chicago, Ill., aircraft exposition.
Jan. 10-17—Philadelphia, Pa., 19th annual automobile show, Commercial Museum building.
Jan. 17-24—Cleveland, O., 19th annual show, Cleveland Automobile Manufacturers' and Dealers' association, Wigmore coliseum.
Jan. 17-24—Hartford, Conn., 13th annual automobile show, Hartford Automobile Dealers' Association, Broad Street Armory, auspices First Regiment, Connecticut State Guard.
Jan. 19-25—Oakland, Cal., automobile show, Civic Auditorium, Motor Car Dealers' Division, Alameda County Automobile Trade Association.
Jan. 21-25—Spokane, Wash., automotive show, Spokane Dealers' association.

Jan. 24-31—Chicago, Ill., show, National Automobile Chamber of Commerce, passenger cars, Coliseum; trucks, Drexel pavilion.

Jan. 24-31—Chicago, Ill., exhibition, commercial cars and accessories, International Amphitheater.

Jan. 26-31—Amsterdam, N. Y., automobile show, benefit of Company H, New York State Armory.

Jan. 31-Feb. 6—Kansas City, Mo., annual exhibition, Overland building.

Feb. 9-13—Louisville, Ky., 17th annual convention, Road Builders' association.

Feb. 9-13—Charlotte, N. C., show of the Carolinas, auspices Charlotte Automotive Trade Association.

Feb. 9-13—Louisville, Ky., 10th American Good Roads Congress.

Feb. 9-13—Louisville, Ky., 11th annual Good Roads show.

Feb. 9-14—Greenville, Mass., automobile show, benefit Company A, Massachusetts State Armory.

Feb. 9-14—Nashville, Tenn., annual show, Nashville Auto Trade association.

Feb. 16-21—Kansas City, Mo., fifth annual tractor show.

Feb. 23-28—Louisville, Ky., 12th annual exhibition, Louisville Automobile Dealers' Association, First Regiment Armory.

Feb. 23-28—Pittsfield, Mass., automobile show, benefit Company F, Massachusetts State Armory.

Feb. 24-March 1—Kansas City, Mo., show of passenger cars, trucks and accessories, Motor Car Dealers' association, Convention hall.

March 1-6—Buffalo, N. Y., 18th annual automobile show, Buffalo Automobile Dealers' association, Broadway auditorium.

March 13-20—Boston, Mass., automobile, truck and accessory show, Mechanics' building.

March 17-18—Lake Charles, La., semi-

annual convention, Louisiana-Mississippi Automotive Trade Association.
May 15-20—San Francisco, Cal., seventh annual foreign trade convention.
June 6-10—Indianapolis, Ind., World Convention of Advertising.

Foreign.

December—Brussels, Belgium, International Automobile Manufacturers' Congress.

Dec. 19-Jan. 4—Paris, France, International Aviation exhibition.

January, 1920—Glasgow, Scotland, Scottish Motor exhibition.

January—Barcelona, Spain, First Salon International de Organizacion Commercial in Palacio de Belles Artes.

Jan. 10-18—Brussels, Belgium, motor car show.

Jan. 17-24—Montreal, Can., automobile and truck show, Grand Palais.

February—Manchester, England, North of England motor exhibition.

Feb. 21-28—Ottawa, Ont., Canada, motor show.

Feb. 23-March 6—Birmingham, England, British Industries fair.

Feb. 23-March 6—Utrecht, Holland, fourth annual fair of Dutch products.

March—London, England, Motor Boat, Marine and Stationary Engine exhibition.

March—Adelaide, Australia, All Australian exhibition of motor vehicles, airplanes, engines and automotive equipment.

March 1-15—Lyons, France, automobile show.

March and April—Pretoria, South Africa, South African Products exposition; overseas motor vehicles specially featured.

April 3-May 4—Buenos Aires, Argentina, exposition of United States manufactures.

August—Paris, France, Grand Prix race, Sporting Commission, Automobile Club of France.

NOTES OF THE TRADE AND INDUSTRY

Dodge Brothers Has Built 400,000 Cars

On Dec. 4, 1914, Dodge Brothers, Detroit, shipped its first car bearing a number plate to a bona fide purchaser. A few days short of the fifth anniversary the 400,000th Dodge car rolled from the assembly line at the factory and swung around the test track for its final inspection before delivery.

In 1914 the works of Dodge Brothers covered approximately 20 acres of floor space, but after unit has been added until now the floor space amounts to 90 acres and the number of employees is more than 18,000.

MILLION DOLLAR PLANT FOR BLOOMFIELD.

The H. J. Koehler Motors Corporation of Newark, N. J., has contracted for the erection of its first manufacturing unit at the new location it recently purchased in Bloomfield, N. J. The new building is to be 100 by 200 feet and will be of heavy mill construction, one story in height, as will be all the units to be built, this limited height being best suited to the nature of the product.

ADDITION TO TEMPLAR MOTORS.

Construction has been started on an addition to the plant of the Templar Motors Corporation, Cleveland, O., which, when completed, will add \$800,000 to the investment of the company, and will give an annual capacity of 10,000 cars.

MAXWELL TO SPEND \$2,500,000.

An official of the Maxwell Motor Co., Inc., Detroit, is quoted as stating that the company is to spend \$2,500,000 in the immediate future on plant improvements.

SAXON REORGANIZATION RATIFIED.

Stockholders of the Saxon Motor Car Corporation, Detroit, unannouncedly endorsed the reorganization plans of the company as outlined by C. A. Pfeffer, secretary and treasurer of the corporation. This plan provides the concern



C. A. Pfeffer, Secretary-Treasurer Saxon Motor Car Corporation.

with a working capital of between \$2,500,000 and \$3,000,000.

The Saxon Motor Car Corporation is now reorganized under the laws of New York, creating a new stock issue of 200,000 shares of no par stock, 60,000 shares of which is exchanged share for share with the present stockholders, and 120,000 shares will be marketed through an underwriting syndicate. The remaining 20,000 shares will be reserved for general corporate uses.

This new plan will put the company on a solid financial footing.

Production of Overland Four 500 a Day

Word comes from the Toledo factory of the Willys-Overland Co. that the production of the Overland Four, the new light car made by this company, has already reached 500 a day, and it is planned to increase this to 600 a day before show flies. The working force of this company is now 12,500 individuals and despite the fact that there has been no street car service in Toledo for some weeks past, the working force has not dropped below 100 per cent., as the Willys-Overland Co. has organized a complete transportation system for employees.

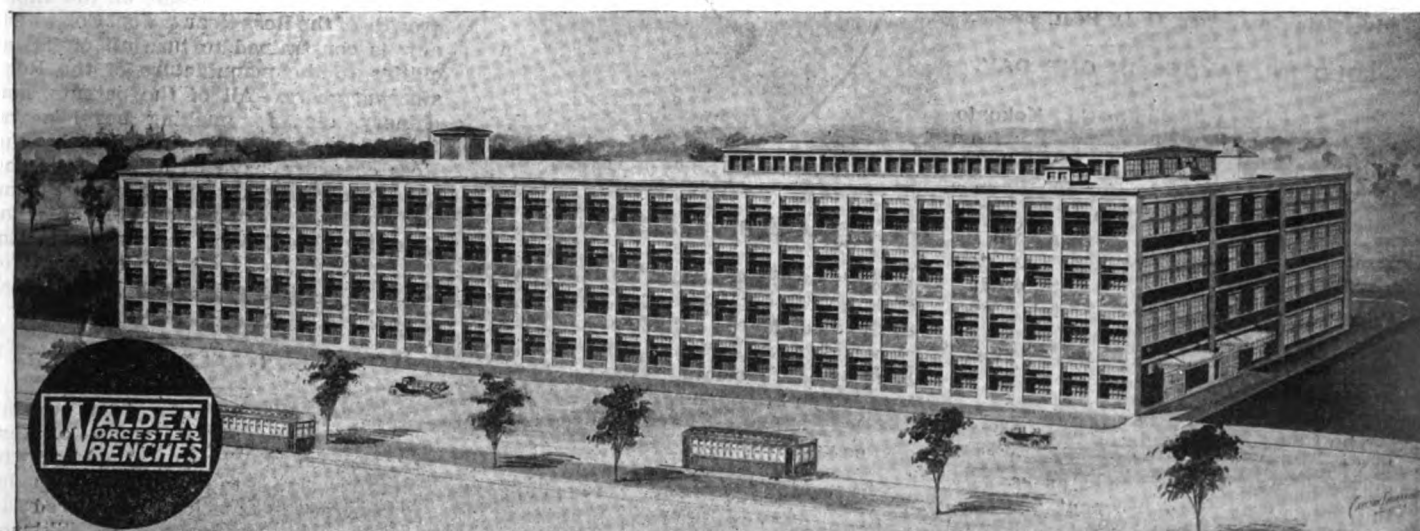
WILL MAKE BODIES.

The Fitz John-Erwin Co. has been incorporated at Muskegon, Mich., with a capital of \$100,000 to make truck bodies and cabs, and reports contracts already secured from several prominent truck manufacturers. The initial factory comprises 25,000 feet of floor space and the site is sufficiently large to permit the addition of units as necessity demands.

The president and general manager of the company is H. A. Fitz John, the vice president is W. C. Powell, the secretary L. B. Erwin and treasurer T. H. Hume.

CAMERON MOTORS' OFFICERS.

The Cameron Motors Corporation, Norwood, Conn., has elected the following officers for the ensuing year: President, Everett S. Cameron, West Haven, Conn.; vice president and general manager, Leslie W. Holmes, Shelton, Conn.; treasurer, Pierpont B. Foster, New Haven, Conn.; production manager, Albert C. White, West Haven, Conn.; director of sales, Harry W. Doherty, New York; other directors, F. S. Young, Fostoria, O., and V. C. Harris, New York.



The New Plant of Walden-Worcester, Inc., Now Being Erected at Worcester, Mass., Which Will Be the Largest Factory in the World Producing Wrenches Exclusively for the Automotive Industry.

Directors Truck Sales Managers' Association

*Prominent Men in Selling End of Industry
Honored at Detroit Convention*



Harry A. Conlon, Acason Motor Truck Co., Detroit, Mich.



H. F. Harris, Bethlehem Corporation, Allentown, Pa.



Hal T. Boulden, Selden Truck Corporation, Rochester, N. Y.

NAPOLEON CO. PLANS TO EXPAND.

The Napoleon Motors Co., Traverse City, Mich., is completing plans for a considerable expansion of its business, with an increase in its factory space through the construction of additional buildings to replace those recently burnt. This company is to cease making passenger cars and in the future will devote its entire attention to the Napoleon truck, which it makes in two models, a one-ton and 1½-ton.

The present officers of the company are: President, W. J. Chase; secretary and treasurer, Frank Trude; general manager, W. G. Rath; factory and production manager, S. H. Rae; purchasing agent, William A. Schmaltz; sales and advertising manager, C. D. Peet.

SOLD 100 HAYNES IN ONE DAY.

The Haynes Automobile Co., Kokomo, Ind., has just received in one day from the Charles W. Tway Co., its distributor in Atlanta, Ga., an order for 100 Haynes cars. This was in addition to other orders sent in during the same month for over 100 cars more. When the new Haynes factory unit is put into production it is expected that the total annual output will reach 15,000 cars.

COMMERCE CAR CO. EXPANDS.

The Commerce Motor Car Co., Detroit, has acquired two additional acres of land at its present location, and as soon as the present units to its plant are completed, it is reported that additional buildings will be erected. This company is making plans to materially increase its production of one and two-ton trucks in 1920.



A. E. Schafer, Gramm-Bernstein Motor Truck Co., Lima, O.

KELLY-SPRINGFIELD BUILDS.

Work was commenced on the erection of large factory buildings by the Kelly-Springfield Motor Truck Co., in Burt street, Springfield, O., as well as on a handsome up-to-date three-story office building on Sheridan avenue. The old office building is to be wrecked and the site occupied by a new unit.

President James L. Geddes of the company states that plans are being made for the manufacture of 7500 Kelly trucks in 1920. The new factories, supplied with improved machinery and equipment, will give the plant a capacity for turning out a finished truck every 20 minutes.

FAIRFIELD MANUFACTURING CO.

Announcement has just been made of the organization of the Fairfield Manufacturing Co., Lafayette, Ind., to take over the manufacture of differential and bevel gears for automobiles, formerly made by the Ross Gear & Tool Co., in connection with the well known Ross steering gears. The officers of the new company, all of whom are prominent in the Ross Gear & Tool Co., are: President, D. L. Ross; vice president and general manager, J. W. DeCou; secretary, Edward A. Ross; treasurer, George C. Kumming; consulting engineer, David E. Ross.

The formation of the Fairfield Manufacturing Co. is the result of the rapid growth of the Ross Gear & Tool Co., which now is constrained to turn all of its facilities to the manufacture of the Ross steering gears. All of the patents, machinery, etc., for making bevel gears, formerly owned and controlled by the Ross company, have been taken over by the Fairfield company. The new company will begin operations in the plant formerly occupied by the Lafayette Engineering Co., and all service parts for differentials formerly made by the Ross organization will also be produced.

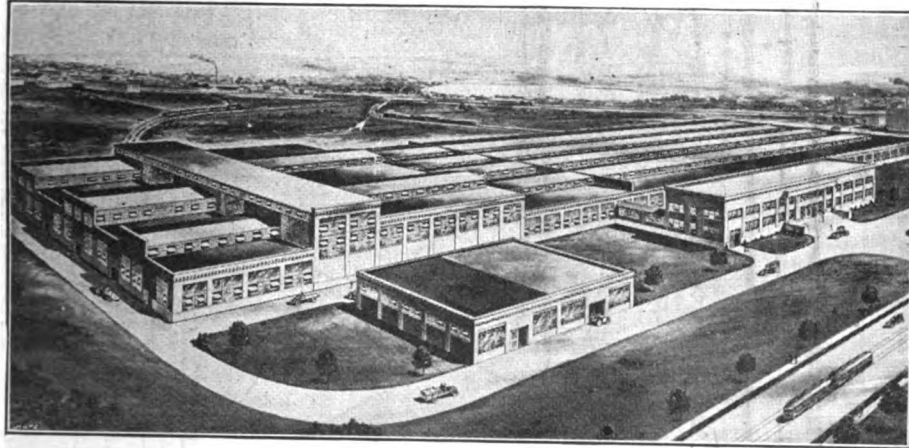
WILKINSON SALES MANAGER.

Robert L. Wilkinson has been appointed sales manager of the Klaxon Co., Newark, succeeding Walter P. Coghlan, who recently resigned to become general sales manager of the American Hammered Piston Ring Co., Baltimore. Mr. Wilkinson has been with the Klaxon organization for 10 years and has a wide circle of friends among the jobbers and dealers.

Personnel of Willys Corporation

John N. Willys, president of the Willys Corporation, has made announcement of the executive personnel which will direct the financial and industrial activities of that corporation for the ensuing year. In addition to Mr. Willys, who continues as president, the officers are as follows:

Vice president in charge of the New York executive office, J. R. Harbeck; vice president in charge of the operations of the Electric Auto-Lite division, C. C. Mininger; vice president in charge of New



The New Plant of the Firestone Steel Products Co., Akron, O., as It Will Appear When Completed at a Cost of \$1,000,000.

York Gear unit operations, J. Allan Smith; vice president in charge of motor car production, Jay V. Hall; treasurer, E. P. Decker; secretary, C. B. Mertz.

The board of directors is composed of John N. Willys, Edward F. Swift, F. S. Wheeler, J. R. Harbeck, Charles Stolberg, C. O. Miniger, J. Allan Smith, Jay V. Hall, C. B. Mertz and J. E. Kepperly.

The main business of the Willys Corporation, the building of a new light six-cylinder motor car at its recently acquired plant at Elizabeth, N. J., will be under the executive charge of J. R. Harbeck, who is also vice president of the American Can Co. and general manager of the munitions operations of that company.

ELECTRIC STORAGE BATTERY HAS GOOD YEAR.

The Electric Storage Battery Co., in its annual report, shows total net earnings of \$3,949,373, as compared with \$2,447,882 in the preceding year. The earnings for last year are equivalent to \$24.45 a share on the common stock without making allowances for Federal taxes. In 1917 the earnings per share were \$15.33.

TWO LYON FAIRS ANNUALLY.

The management of the Lyon (France) Sample Fair has decided hereafter to hold two fairs annually, one in March, as heretofore, and one in October. The motor industry will be included in the spring fair and agricultural machinery will be exhibited at the one in the autumn.

CHANGES NAME TO R & V KNIGHT.

The Root & Van Dervoort Engineering Co., East Moline, Ill., has decided to change its passenger car from Moline-Knight to R & V Knight, thus identifying the car more closely with the company which makes it. This new car is coincident with the appearance this season of entirely new models with new body designs and a new engine. The R & V Knight line for 1920 will consist of two models, one on a six-cylinder chassis with a complete line of body types and the other on a four-cylinder chassis in five-passenger touring and sedan types.

Van Derhoof Forms Bacon Motors Co.

Frederick C. Van Derhoof, who recently resigned as general manager of the automobile department of the Standard Steel Car Co. of Pittsburgh, after being associated with that concern since the organization of its automobile department eight years ago, announces the formation of the Bacon Motors Corporation at New Castle, Pa., of which he has been elected president. This new concern will build a light six, moderately priced car, which will be ready for market early in the spring.

The Bacon Corporation has purchased, at New Castle, a 21-acre factory site, including a new automobile factory, 500 feet long by 100 feet wide, of thoroughly modern construction, capable of producing 50 cars a day. It is capitalized at \$1,500,000, which it plans to increase shortly to \$2,500,000, and starts business without a dollar of indebtedness. The erection of a three-story building 50 by 600 feet is also projected for a body factory, upholstery and painting department adjacent to the present plant. The ground site has a frontage of 687 feet on Butler avenue, a main thoroughfare of the city, and extends 1461 feet along the tracks of the Allegheny Western railroad, from which spur tracks extend into the plot.

Mr. Van Derhoof has associated with him the following officials, all men of large business experience in Pittsburgh and vicinity: Vice president, F. W. Bacon, New Castle; secretary and treasurer, George N. Glass of Pittsburgh; additional directors, D. W. McNaugher, C. D. Scully, W. E. Provost and Edwin N. Ohl, all of Pittsburgh; assistant secretary-treasurer, E. C. Hopkins, New Castle; sales manager, H. L. Archey, Philadelphia. The engineering department is in charge of Erling Oyen, who resigned from the same department of the Standard Steel Co.

RIM AND PARTS FIRM.

The Auto Rim and Parts Co., Manhattan, New York City, has been incorporated with \$5000 capitalization by A. J. Ewald, C. R. Straus and J. H. Cooper, 207 West 76th street, New York.

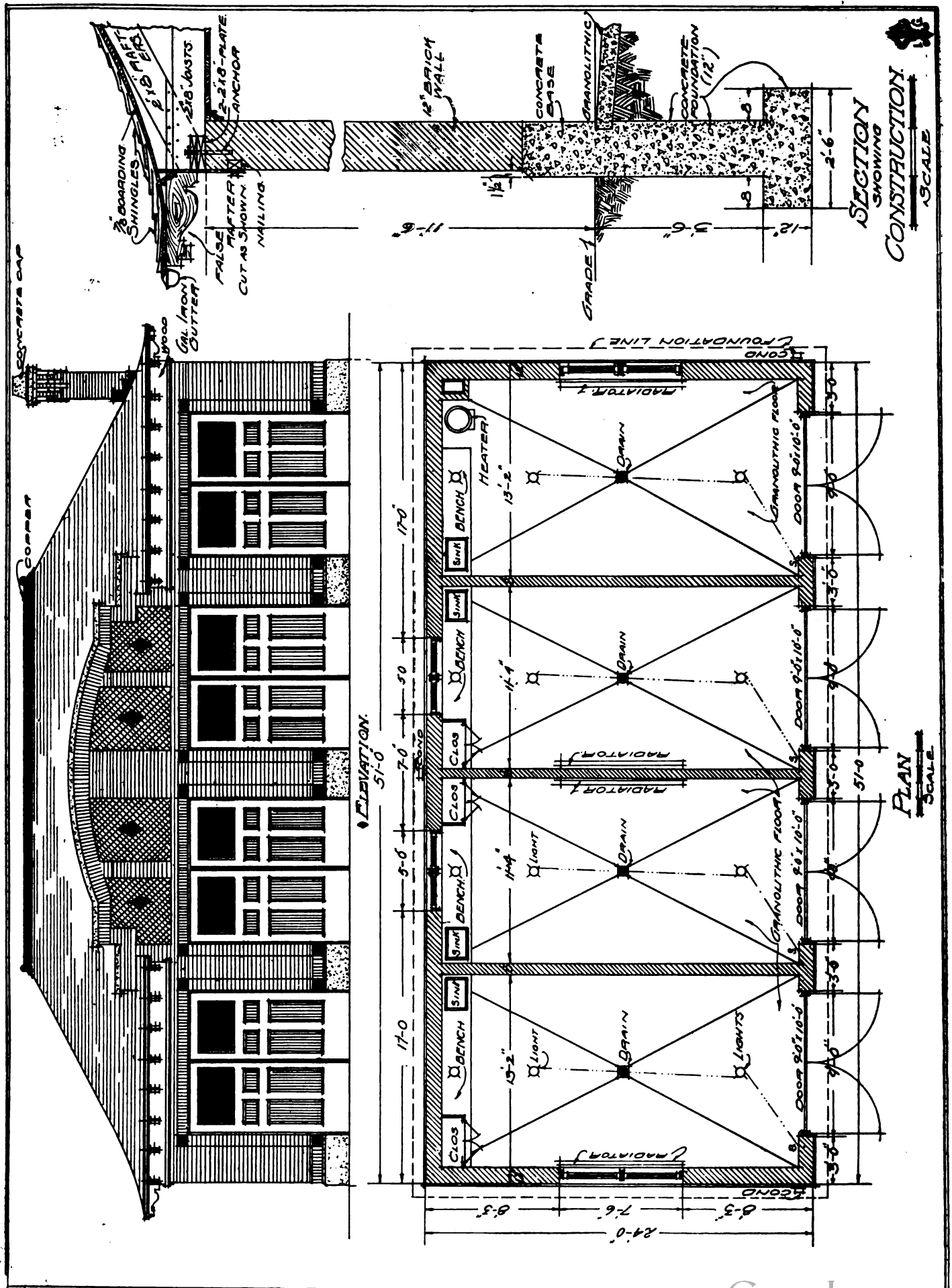
EISEMANN MAGNETOS FOR ROADSTERS AND TRUCKS.

The Eisemann Magneto Co., Brooklyn, N. Y., announces that it has closed a contract to supply the high-tension magneto equipment for the Argonne Four, a new special roadster built by the Jersey City Machine Co. under the supervision of Charles A. Singer.

The Eisemann company also announces the renewal of contracts for magnetos with the Winther Motor Truck Co., The Dart Truck & Tractor Corporation and the Toro Motor Co., and has received orders to supply magnetos for the Dixie Flyer, the passenger car being built by the Kentucky Wagon Co., Louisville, Ky., which company has used Eisemann ignition as standard equipment on its trucks for some time.



Modern Factory Recently Purchased by Bacon Motors Corporation at Newcastle, Pa.



CONVENIENT AND ATTRACTIVE NEIGHBORHOOD GARAGE FOR HOUSING FOUR CARS

Affords Accomodations for Several Machines Under One Roof but So Arranged as to Secure Same Privacy as Individual Garage—Up-to-Date Equipment with Economy in Heating.

IN THE accompanying design an attempt is made to afford the owner a convenient garage for his own car and also to enable him to enjoy remunerative benefit from his investment by housing his neighbors' machines at a reasonable rate. It also possesses qualities that would make it an attractive looking structure for any vicinity.

The area covered by the building as designed is 24 feet wide and 51 feet long, and its height is 11½ feet to the plate. The superstructure is of brick with tile inserts, having a wooden cornice with sawed false rafters as a feature, supporting a wooden roof of the hipped type, surmounted by a copper ridge. There are four compartments, each in itself a private garage, for it has no connection whatever with its next-door neighbor and has all the privacy of an individual garage. Entrance is through large double-swing doors nine feet wide and 10 feet high. The compartments are well lighted and ventilated, the two middle ones having windows in the rear wall as well as in the doors and in the end stalls windows are found in the side walls and doors.

Common Heater for All Compartments.

In the right hand compartment a small heater of the Wasco type may be used and this section as a rule is occupied by the owner who takes care of the heater. The foundation is of concrete 12 inches thick, resting on a footing 2½ feet wide and one foot deep, and this foundation is placed below frost line, as can be seen in the sectional drawing, and this is 3½ feet below grade plus one foot for footing. The mixture for this will be found very satisfactory at 1:3:5 for both foundation and footing, this being one part Portland cement, three parts sand and five parts crushed stone. A base course has been formed by permitting the foundation to extend above grade as shown in the sectional drawing. At the time the foundation is poured it is advisable to make arrangements to put the floor in simultaneously, considerable time and money being saved by so doing. In the floor plans should be made for proper drainage as shown, for a garage without such provision is not much better than a shack used for just housing the car.

Brick constitutes the superstructure, the outer walls being 12 inches in thickness, and the party or dividing walls eight inches thick. A rough textured brick with a ¾-inch joint, rough struck, makes an extremely interesting effect and the design herewith shown has a few tile inlays that add a little extra color and life to the general ap-

pearance. Cast concrete forms the coping on the panelled parapet over the two central doors and this should be cast and anchored in accordance with the best practise.

The roof is of wood with either wood or asbestos shingles, the latter coming in various color values and being fire resisting in nature. A copper-covered ridge piece is shown, which gives an extra finishing touch to the roof. From the point of construction the make-up of the roof is as follows: The main rafters are to be spruce, two by eight inches, placed two feet on center. The ceiling joists are also two by eight-inch spruce placed the same as the roof rafters, two feet on center. A plate, four by eight inches, anchored to the brick wall, acts as a cushion and for nailing for both rafters and joists. An ornamental sawed bracket of the false rafter type is shown and this nails right on to the rafters. The general cornice effect is produced by the small architrave with a frieze band and crown mould fitting snugly against the brick and nailed to the framing of the roof. Drainage is by galvanized iron gutters of the hanging type as shown, these being drained by three four-inch copper conductors as seen on the plan.

Construction of Windows and Doors.

The windows may be of the pintled sash type or may drop in, just as the owner desires, or can be made double hung. The method shown is the plank frame type adaptable to either of the two foregoing forms. White pine makes excellent stock for the frames and should be at least 1¾ inches thick with single or double rebate with an outside staff bead 1¼ inches in thickness. The door frames are made from three by six-inch pine with wind stop strips tacked on the sides anchoring the frame firmly to the masonry. A large 1¾-inch staff bead is used. Swinging doors are provided, 2¾ inches in thickness, with sash as shown; panelled lower section as depicted with ½-inch matched sheathing. The construction of the door sill is very simple: A small angle is used as a door stop and also a weather stop anchor to the floor and installed when the floor is placed in position.

Each compartment is equipped with running water, electric lights and heat. A large sink, a work bench and a closet are also included.

The approximate cost of a garage of this type is \$2000 and each compartment should readily rent for \$8, giving a good return on the outlay.

Dame Fashion Defies Jack Frost

Latest Designs in Sweaters and Motor Coats in Fur and Seasonable Fabrics Which Make Winter Motoring Pleasurable.

By Mrs. A. Sherman Hitchcock.

IF YOU would be a motorist and would be motoring go, it behooves you to see that your motoring costume is in keeping with the dictates of fashion and with the affairs of the hour. It is difficult this season to talk of fashions without referring to those intended for motoring wear and whenever the feminine motorist goes on a shopping trip she is confronted by motor coats, sweaters, motor hats, motor frocks, motor veils, motor gloves, motor hose—the shops are full of them. The best of these attractive models, coming as they do from exclusive designers, are expensive, but the ideas they represent are free to every observing woman without any expense attached, and it is really the idea that counts for originality and chic.

Every woman who enjoys motoring, whether as an active participant or an occasional passenger, must own a sweater, and the new models are so fascinating and so practical that every woman wants to own more than one. Nothing is more practical or attractive than the brushed worsted Tuxedo coat sweaters and they are bound to be enormously popular for motoring wear. I am showing an exceptionally good model which features all the new points. The fringe around the bottom of the garment and the narrow belt of leather are decidedly modish and are to be found on the leading models. The lapels can be turned over and buttoned like the regulation coat sweater and it comes in excellent colors, including the smart brown and green heather, American beauty, peacock, gray, navy, brown and black.

Sweaters of various weights, colors and styles afford just the protection women find most easy to utilize in the motoring sport, from the knock-about garment of dark, durable wool such as our soldiers wore, to the more attractive ones of the brushed variety, or knitted silk. Crocheted saques and slip-ons, in fact, anything sweater like, is welcome to Milady Mobile's wardrobe. For wear at the Country club, or at an informal luncheon, silk sweaters are seen, many in the filet stitch, but these do not furnish very much warmth, although they are smart and effective. Some unusual sweaters were shown me recently which were exceedingly attractive. An Oriental effect was given one model in two shades of jade green trimmed with gray angora by having the tie ends finished with Chinese beads. A turquoise blue and raspberry red formed an unusual color combination and was very charming. It was knitted and purled in an odd way—the lower part was purled and was edged with a border of straight knitting. The slip-over fishtail, ripple, Tuxedo and coat models are all very modish.

Leather coats are no longer looked upon as novelties, and are fast becoming a necessity of the motor outfit. They have been found to be so thoroughly comfortable and protective that they have become a standard garment. The Leatherex model herewith illustrated is a very smart new model and has many features to recommend it strongly to the discriminating woman. The Leatherex is an excellent material, being waterproof, and will not scratch or peel, as



One of the Newest and Most Attractive Motor Tunics and Scarfs Which Has Been Designed for Winter. Built of Angora Wool and Trimmed Most Effectively with "J. C." Mexican Fancy Ribbon. Tunic and Scarf Designed by William Bloom, New York City.

(Courtesy: Johnson, Cowdin & Co., Inc., New York City.)

do some leathers. It may be easily cleaned when soiled by washing with water and will not stiffen or harden, as will the majority of leather. It is also very light in weight and very uniform in shade, odorless and does not crack. The garments of Leatherex are to be highly recommended for motor wear. In the main these coats show the full belted model in hip length and a few show collars of fur. They are sporty looking creations built for rough and ready outdoor wear; some are lined, others are just made of the material.

A beautiful new material, which will be used largely by the fashionable motor woman, is Camelora cloth. It is made of the finest grade wool and has been endorsed by the leading couturiers because of its smart appearance and luxurious

effect. In the camel's hair finish it is ideal for touring purposes. The new colors are all represented, oak, twine, tangerine, castor, navy, Copenhagen, Pekin, beaver, tan and black. It is extremely light in weight and as soft as velvet.

The leading shops are now featuring coats of pony skin, a fur of which we have seen little or nothing during the past few seasons. This fur, being a strictly Russian article, is hard to get under the existing circumstances in that country and with but a limited supply in the United States, it will not become as common as it was several years ago but, on the contrary, it is said to be practically the coming fur as far as popularity is concerned. The wearing qualities of pony are exceptionally good and when well made and trimmed the garments are decidedly handsome. I am showing two extremely new pony coats of Vogel make, which is a sufficient recommendation for the knowing woman. The pony skin has been treated by an entirely new method and the appearance is not unlike broad-tail. They are of finer quality, better worked and made in far more attractive styles than were their predecessors of some half dozen years ago.

Marmot Coats Are in Favor.

Marmot coats are being used considerably by motor women this winter. A taupe nutria coat with flare back and belted front is among the attractive models, and another is a Siberian gray squirrel featuring dolman sleeves and large cape collar. There are some French seal models with collars of beaver, deep reverse border and cuffs of seal that are very good looking. Two attractive models were in pony combined with Hudson seal and Australian opossum. The black pony and Hudson seal was in a box model. The collar and cuffs were of the seal. Beaver and raccoon are also used to enhance the attractive qualities of the new pony coats.

There is no doubt of the favor given one-piece dresses by motorists this season, and indeed this particular article of dress is now considered indispensable. In the motoring wardrobe, it has become an absolute necessity and no woman could be really well dressed without its aid. The wool one-piece dresses are high in fashion's favor and are so very practical and comfortable, beside being so becoming to the majority of women, that their long life is certain. The chemise model is still in the lead and practically everything is on straight lines. The nipped-in waist line, which some designers have been trying to feature, is not a success. Women have become so emancipated that they will not espouse any style which makes them uncomfort-



A Very New Model Sweater of Brushed Worsted in Tuxedo Style, One of the Best of the Present Season and an Exceedingly Practical and Comfortable Garment for the Motor Woman.

(Courtesy United Knitwear Mills, New York City.)

able, and it is certainly a credit to their good common sense that this is so.

For motor dresses, which may also be worn on the street and at all informal affairs, nothing is better than serge. No material has ever been created that fills the requirements of serge in every respect. Smart in appearance, wonderful in its enduring qualities and adaptable to the most modish styles, serge cannot be excelled. It is very hard to get in first class qualities and colors nowadays and a great deal of this material is on the market that is far from being all wool. A serge that is not all wool is one of the poorest investments in the world, for it will shrink badly and lose its color easily. No doubt every one has seen the serge sold for navy blue, but which after getting wet or being exposed to the sun's rays, turned into a horrible purple tone. An absolutely dependable serge, which is probably the best in the country, is the Admiralty serge. It is guaranteed to be absolutely all wool and shrunk, can be washed in hot water, soap and soda and will not change color. Neither will it fade when exposed to the sun, sea air or sea water. This is knowledge worth having for it means many dollars in one's pocket and that is quite an important item nowadays. The colors in the Admiralty serge are all of great excellence and suited to the woman of fastidious taste. Soft box pleats are used on a navy blue Admiralty model, the pleats set into the waistband about two inches below the top of the skirt, leaving a ruche at the top. There is a high collar, faced with flame red silk, and so cut that it may be worn down if desired. A touch of the color is in the lining of the cuff-like trimming on the sleeves, a straight

piece brought around the wrist, and leaving two loose ends. Other smart dresses of Admiralty serge are chemise type, with loose waist, and skirt hanging straight, or cut peg top, with pockets in the openings above the hips. Models of this type have rows of stitching, or embroidery for trimming. The triangular-shaped pocket also carries the design.

For the one-piece of more dressy occasion, nothing can exceed for beauty the lovely new Crystal Knit and Sylvanette fabrics. There are the most exquisite colors, including all the new browns, blues, rose and pink. The weaves in the Crystal Knit are the finest and most beautiful imaginable, both in plain and drop-stitch. In the Sylvanette the weaves are most unusual and original and exceed anything I have seen in this type of knitted silk. There are a number of knitted silks on the market at the present time, but one requires a little specific knowledge before making their purchase if they desire entirely satisfactory results. A charming frock of dark blue Crystal Knit has a plain narrow skirt joined to the bodice, at a low hip line with a knitted network of matching wool. It has a yoke and lower sleeve portion of the network, and there is also a knitted sash with ball ends tied loosely at one side.

While we are talking about one-piece motor dresses, it isn't by any means any too early to mention one of the new spring materials which the home dress-maker can find after the holidays and thus begin to prepare for the southern trip, or a season at home, as the case may be. There are some very new Zephyrs—it will be their first season in this country—which carry the most wonderful recommendation possible, and with which every motor woman should familiarize herself. We all know how easily some of the Zephyrs lose color after one or two tubbings and the dress is of no further use in the wardrobe. In these new Zephyrs—they are the Burgess Ledward fabrics—are the loveliest colors and designs and the quality is exceptionally fine. The manufacturers guarantee these fabrics to be fast in color and they guarantee not alone to make good on the cost of the fabrics, but to also replace the garment if the color fades from any cause. They are colored with the famous Duro dyes and they are said to exceed anything known. These Zephyrs come in charming checks and plaids in a varied assortment of colors and will make the most lovely of dresses, as well as chic little motor hats for the South.

A New Hat Shield.

A new hat shield has just been brought to light, called the "Stop-a-Drop." It will be welcomed by the motorist without a doubt. It comes in a neutral shade of gray and is a fine cotton which has been rubberized, and is so arranged with glove fasteners and cords that it can be adjusted to fit any size hat or turban. It has been thoroughly tried out on long motor trips and keeps out both dust and rain. The cover is rolled flat, tied with cords and will easily fit into the coat pocket or motor bag. Unlike the majority of

these affairs it is not conspicuous.

Tams of duvetyn, velour, peachblow and similar fabrics are enjoying a great vogue with smartly dressed motorists. Their jauntiness appeals and they fit the head admirably. Fur tams are also modish. A smart motor tam of King Albert blue duvetyn, cocked at a coquettish angle, was worn recently with a blue sweater of heavy wool and an orange and black skirt. Duvetyn hats on the high-crown sailor type are worn with close fitting veils of chiffon cloth, the veils being the only trimming. Tams of camel's hair to match coats are often seen, although the beaver tams are also noticed with fur-trimmed camel's hair coats. Many dark brown, stiff silk sailors are being worn by smartly dressed motorists, especially with the fur coats. These sailors have high crowns and narrow brims and are really the smartest hats of the present season. No particular style of motor hat is leading. All small shapes are liked. The small tams and Hindu shapes made of material of different kinds are the most numerous. These, especially the tams, have a trimming of stitching of a contrasting color in wool. The dark brown hats of duvetyn are usually trimmed with a light shade of tan wool in a dark stitch around the edge of the tam. No other trimming is as popular at the present time. Often a bright



This Very Newest and Handsome Garment in Fur of Pony Skin in Its New and Improved Treatment, Combined with Hudson Seal, Is Ideal for Motor Wear. Its Novelty and Beauty Combined with Its Extreme Smartness Make It Just the Right Buy for the Motor Woman.

(Courtesy A. H. Vogel & Co., New York City.)

shade of wool is used around the edge.

The leather motor hats are very popular and are particularly smart worn with the leather coat. A very tailored hat of all leather with a facing of faille is shown in a yellow shade. The brim is slashed and suggests fringe, with a tailored side bow. The sailor shape in leather is also shown. Black leather is shown in very tailored types with satin facings. A Copenhagen blue taffeta hat has a facing of beaver and there are leather covered buttons held about the crown edge with wool. Chin-chin shapes are well liked and are especially smart in satin. Leather tams come in bottle green, old rose, delft blue and the browns.

A motor petticoat is one of the very new accessories. It is made of a light weight wool in knit style and trimmed with a grosgrain ribbon, embroidered in contrasting shades, which passes around the hips, crosses in front and circles the lower part of the skirt. There are other new motor petticoats in satin, wadded throughout with lamb's wool, and lined with taffeta or crepe de chine.

There are very handsome new motor bags in the shops. Many fabric bags are shown, such as the Batik patterns on duvetyn and crepe de chine mounted on celluloid frames and hung by a cord. Then there are the tapestry-fabrics made into motor bags and mounted on bone frames that are beautifully carved. A novelty is a bag made of Paisley shawl with the pattern worked in beads. Mo-

tor vanity cases of leather and fabric are being shown and are well liked. They are of vachette leather or Japanese leather burned-in pattern, or again they may be of silk brocade. They are fitted with compartments and vanity fixings and suspended on a single loop of metal chain.

Motor handbags of fur are smart, the most popular of pelts for these accessories being mole, seal and Russian squirrel. The bags are framed either in silver or gilt. Some are very uniquely shaped and are suspended from heavy cords, tipped with fur tassels. One particularly novel bag is of gray squirrel, inset with velvet, bearing a beaded flower, the lower edge of this "lucky" motor bag being fringed with tiny rabbits' feet.

Small motor muffs are modish this winter and are made in beaver, kit fox, pulled rabbit and flat furs of other kinds. Monkey, in combination with caracul, is much liked by smart motor women. A novelty in muffs is of mole skin with a festoon of suede dyed fringe to match. The muffs are very small, being just large enough to get the hands well in.

HEAVIEST PRODUCTION FOR ANY ONE MONTH.

According to reports just made public by the traffic department of the National Automobile Chamber of Commerce, the car load shipments of motor vehicles in October amounted to 29,742 car loads, compared with 10,667 car loads in October, 1918. In addition to this the factories in the Michigan-Toledo territory delivered 12,457 machines to dealers who drove them away. Shipments by water from Detroit and near-by factories amounted to 3687 machines. This is a new record for a month's shipments.

These drive-aways and boat shipments are equivalent to 4750 car loads, indicating that production in October amounted to 34,492 car loads. The largest previous month's shipments of which the chamber has any record, was 29,622 car loads in March, 1916.

HARTFORD DEALERS' SHOW.

The 13th annual automobile show of the Hartford Automobile Dealers' Association will be held at the Broad Street Armory in that city Jan. 17-24, under the auspices of the First Regiment, Connecticut State Guard. Passenger cars, trucks and accessories will be shown. The committee having the arrangements in hand consists of Arthur Fifoot, secretary of the Hartford Dealers' Association, who is the manager; Ben F. Smith, chairman; John D. Evans and Dwight A. Burnham.

STATE GARAGE IN NEWARK.

The State Garage, Newark, N. J., has been incorporated with \$125,000 capitalization, to operate automobiles, etc., by J. H. Steinhardt, Max Kreuger and Louis Koppeln, all of Newark.



A Beautiful Russian Pony Model. Combined with Beaver, and Having the New Ideas Worked in Most Effectively. The Pony Skin Is the Attractive Natural Color, or Brown, and the Rich Shade of the Beaver Makes a Decidedly Handsome Combination. The Large Shawl Collars Appear on All the Best Coat Models and Are Very Protective and Desirable.

(Courtesy A. H. Vogel & Co., New York City.)

AIRPLANES FOR PRIVATE USE.

The James Levy Motors Co., Buick dealer at 23rd street and Michigan avenue, Chicago, is among the first concerns in that section to take up the sale of airplanes for private use. It is stated that Buick salesmen are especially qualified to handle air craft equipped with motors of the type of the Liberty motor, which embody the valve in the head principle.

In Chicago there are a few business men who live in one of the residence suburbs, who have purchased hydro-airplanes in which they are daily transported to and from business, landing on the smooth waters of the lake front within a few minutes walk from their places of business. This is a confirmation of the modern transportation goal, the constant reaching out for greater speed.

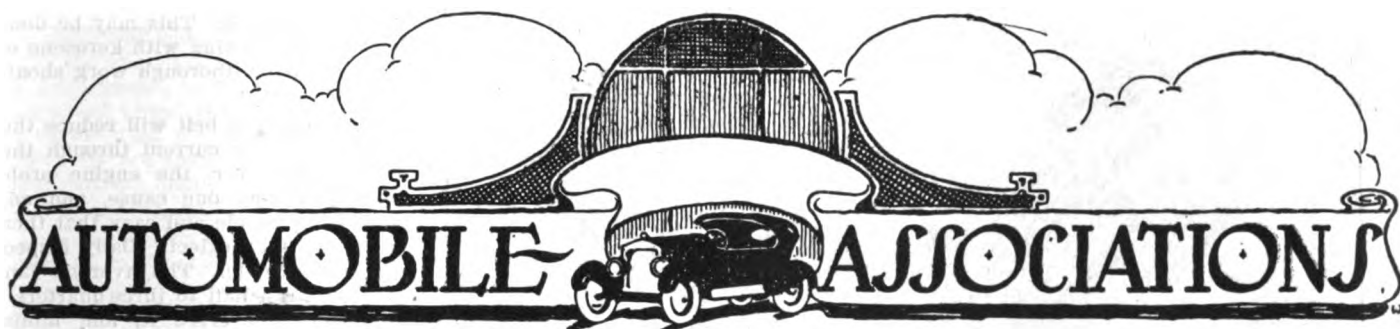
The displays of airplane designed for private use, wherever made in the business sections of the large cities all over the country, are attracting unusual interest not alone from their novelty, but for their possibilities for general use as practical passenger and freight carriers in the near future.

Gasoline sold for six cents a gallon in 1908.



One-Piece Dress Made of Brown Satin Duvetyn, Built on Modish Lines. The Effective Turban Is Made of Indestructible Vofle with Metal Embroidery.

(Courtesy A. H. Vogel & Co., New York City.)



Annual Meeting New York Association

The New York State Automobile Association at its recent annual convention, re-elected H. W. Robbins, Medina, president. This was the only officer elected. Dunkirk was decided upon as the place for the convention next year. Governor Alfred Smith, speaking at the convention, said that the real benefit of the Knight-Wheelock law was lost because it applied only to New York city automobile operators. Motorists from other sections of the state, the governor said, enter New York city ignorant of the qualifications of the law, and such persons, lacking the experience of the traffic of the city, needed the requirements of that law more than the residents of New York themselves. It is surely interesting to note that now after the law has been in operation it should apply statewide instead of to the New York city motorists only. That opinion was expressed by Governor Smith and by Magistrate W. Bruce Cobb of the New York City Traffic Court.

The Monroe County, Pa., Auto Club at a meeting in Stroudsburg, decided to urge officials of the county to go after the county's share of the road money which is said to be lying idle in the state treasury. If proper application is not made soon it will be too late to receive any of this money. A representative of the State Highway Department said that the state would give aid in fixing the road from Paradise Valley to Swiftwater, a road which is greatly traveled in the summer months and which is now in a deplorable condition. John L. Westbrook, Harry Oildorf and C. B. Ellenberger were appointed a committee to meet the county commissioners to try to get financial aid from the state.

The Motor Club of Lackawanna County, Pa., recently appeared before the City Council of Scranton and urged the hard surfacing of a section of road between that city and Pittston, Pa., over which there is a great amount of motor traffic, and also advocated the paving of a number of roads in the vicinity of the cities.

The Little Rock Automobile Club of Arkansas has increased its dues so as to provide ample revenue to carry on its work for the coming year. M. A. Stone has been appointed chairman of the membership committee by President A. C. Remmel, and will start a vigorous membership campaign. Membership in the Little Rock Motor club includes also af-

iliation with the American Automobile association and the Arkansas Automobile association. Permanent headquarters are to be established at once in some convenient location and data are to be collected for the benefit of tourists as well as for local car owners. One of the first campaigns to be instituted by the club will be for the placing of proper signs on the roads of Pulaski county, and the elimination of railroad grade crossings.

The Automobile Club of Maryland at its annual meeting re-elected the following officers: President, John S. Bridges; vice president, H. P. Gardner, Jr.; secretary, H. M. Lucius; treasurer, Thomas G. Young; board of governors, E. E. Foster, Martin J. Kohn, W. Stran McCurley. The feature of the evening was an address on "Automobile Lubrication" by W. A. Edmondson, together with a programme of motion pictures.

Texas State Association Formed

The Texas State Automobile Association, composed of automobile owners, was recently organized at San Antonio. The following temporary officers were elected: President, W. A. Williamson; first vice president, Porter Loring; second vice president, R. M. Worley; treasurer, J. K. B. Beretta; directors, S. B. Weller, Percy Tyrrell, Emil Frank, S. E. Hays and A. J. Castanoa. The association decided to promote legislation fair to the automobile owner and to cooperate in good roads matters.

The New York State Automobile Association, through action of its executive committee, has completed plans for a campaign to force a more rigid and general observation of the motor vehicle, uniform traffic and anti-glare headlight laws. Every one of its 20,000 members will aid in running down chronic violators. The association has consistently and successfully opposed freak and burdensome legislation. There are, however, 480,000 New York motorists outside of the state association. Members will take the license numbers of cars of violators to the Albany headquarters of the association, purely in a spirit of friendly co-operation, it is announced.

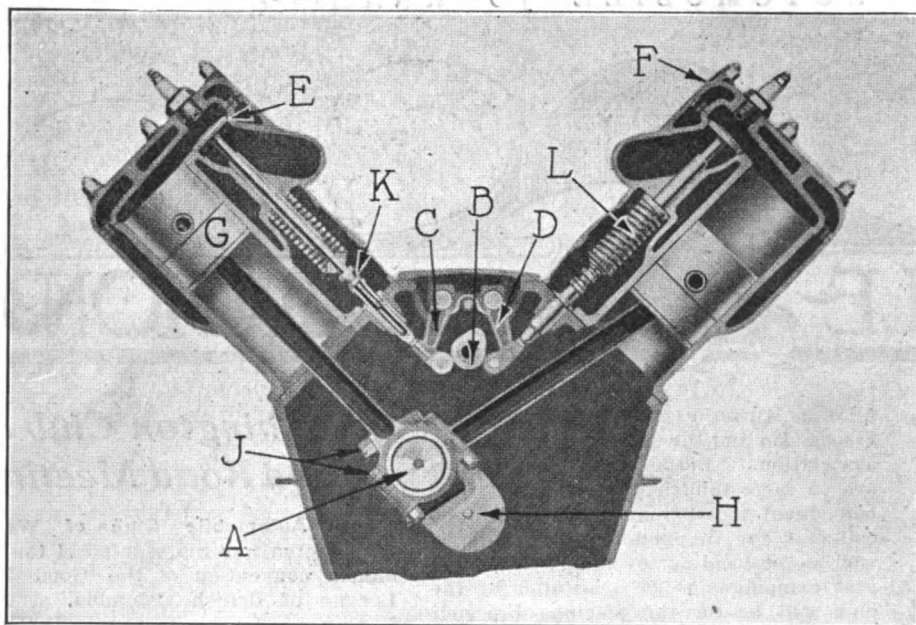
The Automobile Club of America, through its board of governors, recently gave a dinner in honor of Francis M. Hugo, secretary of State of New York, to mark the fifth anniversary of his service as the head of the club.

Washington Club at Good Road Meeting

The Automobile Club of Western Washington was represented at the third annual convention of the Good Roads League of British Columbia, at North Vancouver, by its manager, D. Shelor, who spoke on the "Value of Auto Clubs." He said: "I think automobile clubs should rather be called Automobile Owners' Service Associations. If you wish to go to Ottawa by train you go to the depot and expect to be able to obtain information about trains and their schedules, their routes, the time it takes to go from one place to another and so on. You want to arrange everything so that when you get in the coach you just sit down against the plush seat and let the railway do the rest. Why should not a man traveling in his motor get the same service? Why should he not be able to go to a public place and get accurate, intelligent information and maps about his intended journey? He is willing to pay his way, but he wants real facts from an intelligent person, but he cannot get them unless you build up your clubs."

The Delaware Automobile Association, at its semi-annual meeting in the Hotel du Pont, Wilmington, elected the following officers: President, Harry T. Graham, re-elected; first vice president, William H. Danzenbaker, Claymont; second vice president, F. C. Bryant, Wyoming; third vice president, Edwin C. Marshall, Lewes; secretary, Charles G. Guyer; treasurer, William Staniar; executive committeemen at large, Frank W. Piereson, Richard W. Bond, J. Hunt Holt. The association now has 905 members. R. T. Read of the Delaware State Safety council, spoke of several ways to avoid at least 50 per cent. of the accidents that are increasing in ratio to the increase in number of automobiles; among them being the establishing of a school for police and chauffeurs, and a vigilance committee to stop reckless driving on the part of motorists.

The Lu Lu Temple Automobile Club of Philadelphia observed Thanksgiving this year with the customary banquet, entertainment and dance. The toastmaster was Joseph Way, president of the club, and among the post-prandial speakers was Potentate Charles Bair. The committee of arrangements consisted of Walter Van Court, chairman, assisted by Benjamin Foster, Chris Weber and W. Schempf.



Cylinder and Piston Assembly, Cadillac Power Plant—A, Crankshaft; B, Camshaft; C and D, Tappet and Tappet Arms; E, Valve and Valve Seat; F, Separable Head; G, Piston; H, Counterweight on Crankshaft; J, Connecting Rod Bearing Caps and Bolts; K, Tappet Adjustment; L, Valve Spring.

(Continued from Page 35.)

cylinders will rust or become covered with scale, and this will greatly lessen the diffusion of heat. Just as scale in a boiler will reduce the capacity for steam production with a given fuel unit, so will rust on the walls of the water chambers lessen the absorption of heat. Cleaning the cylinder jacket with a solution of sal soda in the proportion of a half pound to five gallons of water, running the engine a day if possible, and then flushing with clean water, each time running the engine after filling until the water is heated, will reduce the scale and promote radiation materially.

Hose connections will soften, the fabric will rot and rupture and the water passages will be more or less obstructed. Such obstructions will have varying effect because the conditions will change, but they cannot be determined unless the hose is removed and examined. Sometimes air locks will form in a cooling system, which will greatly reduce efficiency. These cannot be located with certainty and are often puzzling. Of course an obstruction will affect a thermo-syphon circulation more than it will a pumped circulation.

In cold weather the water pump may freeze and the impeller may be broken or the key sheared by starting, which will result in the water in the engine jacket heating quickly and boiling. The same result will be noticeable if the radiator freezes and the water cannot circulate through it. One understands that these statements will not apply when calcium chloride, water and alcohol and water, alcohol and glycerine solutions are used.

The radiator should be filled to the top of the overflow pipe. Inspection should be made daily, and replenishment is not to be neglected. Unless the radiator inlet is neglected with water circulation is not certain, and boiling is a probability. When alcohol is used in solution it is re-

duced by volatilization and more rapidly by heating, and more alcohol should be added. When the desired proportion to afford protection against freezing has been obtained the specific gravity should be read with a hydrometer, and by tests for specific gravity at frequent intervals the solution can be kept close to a standard. Radiators should be covered so far as possible.

Oils used for engine lubrication have either a paraffine or asphalt base, and as paraffine is a wax or grease that solidifies when cold, this will not have the same degree of residuum when subjected to heat as will an asphaltic oil. Dust and organic matter from containers used for handling the oil, metallic particles caused by friction and dust carried into the cylinders with the fuel will not be consumed or exhausted. The accumulations become baked from heat and wherever there are points or edges may become incandescent and cause fuel to ignite before the spark has been made.

While the charge is but partly compressed the force is sufficient to greatly reduce the power of the engine and, of course, with no impelling force on the expansion stroke the engine will jump or "buck." This "bucking" often results from sooted spark plugs which will not ignite the fuel. The effect might be judged as resulting from the one or the other, but examination of the plugs will probably determine which. If an engine will fire after the switch has been opened preignition is safe conclusion. If a

metallic knock is heard carbon is the probable cause. Cleaning the cylinders is the only work. This may be done by burning, by soaking with kerosene or by scraping, but a thorough work should be insured.

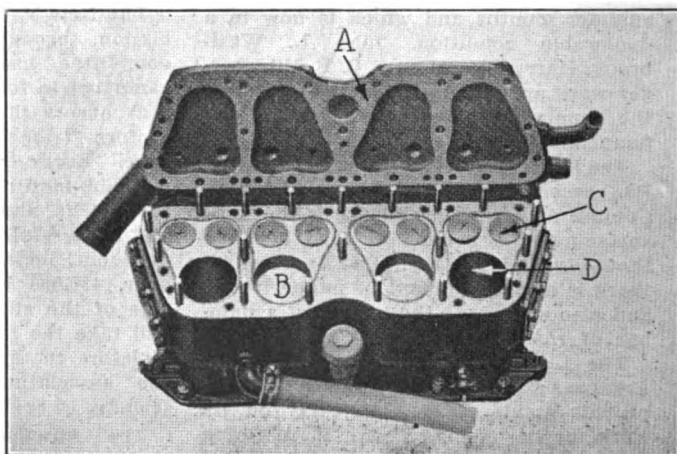
A slipping fan belt will reduce the velocity of the air current through the radiator and over the engine probably more than any one cause, and adjustment is so simple and easy that there is no excuse for neglect. Daily inspection should be made. The average fan requires from a half to three-quarters of a horsepower to drive it, and minimum power consumption is insured by frequent lubrication of the fan shaft bearing. This may be a ball or roller type and may be lubricated by an oil cup or a grease cup. If the belt is worn, replace it. Examine the bearing occasionally and keep it well adjusted.

Drag of Brakes a Heavy Loss.

Theoretically the brake shoes ought to clamp the wheel or shaft drums equally. Those who are experienced can adjust them to this condition of efficiency. The shoes should just clear the drums and the linkage should be so adjusted that whenever pressure is applied to a pedal or lever the shoes will engage. When the brake shoes are so loose that considerable movement of the pedal or lever is necessary to engage them a decided jolt or jar follows, which unnecessarily stresses the entire car, and the effect is much like a blow instead of a gradually retarding influence and is by no means as effectual. Unless the shoes clear the drums more power is necessary to drive the machine, the shoes are quickly worn and the safety of the vehicle and its occupants is endangered.

Engine bearings are seldom too tight for any length of time. Even if so tight after an overhaul that towing is necessary to turn the engine, the bearings will quickly limber. Care should be taken, however, in the event of overhaul or adjustment, to fit the bearings well, for this is one of the most important works. One had best pay well to have the work done, for it will be more economical than making what may prove to be a costly attempt at saving.

Losses of power other than those that have been dealt with may result from



Cadillac Eight Power Plant, Side View of Engine, Showing Detachable Head Removed from Right Hand Cylinder Block—A, Detachable Head; B, Piston; C, Valve; D, Cylinder.

conditions developing with use in the valves, pistons, rings and gaskets. Sometimes these conditions will be in combination. If the engine is a separable head type a head gasket is necessary. With some types of I-head engines the valves are in cages fitted with gaskets. In any event gaskets are necessary for the intake and exhaust manifolds.

The separable head gasket must be water, oil and gas tight. It must resist a pressure up to 250 pounds to the square inch. Generally these are copper-asbestos and are substantial. If coated with oil when installed, to insure finding a seat under pressure, and the studs are drawn down even and seated solidly when the engine is warm, there should be no leak.

The valve cage must endure the same pressure, but there is seldom probability of serious leakage. The gaskets of the intake and exhaust manifolds are not subjected to heavy pressure, but they must be tight. The valve cage gaskets can be seated after a thin coat of oil has been applied. The cages must be well seated. The manifold gaskets should also be coated with oil before the manifolds are bolted on. All should be drawn solid after the engine has heated. The gaskets are between machined faces, but unless they are lubricated so that they will conform to the faces under pressure there may be leakage.

Valve caps, for I-head engines with the heads integral with the blocks, compression relief cocks and spark plugs are seated in bores without packing. There should be no leakage about them. The caps are probably cast iron or semi-steel, the relief cocks brass and the spark plug bushings steel. If wet the bores in the engine blocks and the valve caps and spark plug bushings will rust. Rusting may make a tight fit, but increases the labor of removal. Coating the threads with oil and powdered graphite will prevent rusting, facilitate removal, insure perfect seating and make a tight union.

If leakage at the gaskets, relief cocks or spark plugs is suspected, drop a thin oil on the joint while the engine is warm and running, and leaks will be indicated by bubbles forming in the oil. If leaks are found, tighten the parts, or, if this does not serve, replace them. These leaks may cause considerable loss of compression.

Causes of Power Loss.

The probable causes of loss of power are reduced compression, defective valves, ignition defects and poor carburetion. Compression reduction may result from such leakages as have been described, the compressed fuel or the burning gas escaping from the combustion chambers. Or the valves may be dis-

torted so they will not seat true in the ports, or they may be prevented seating by particles of carbon on the valves or seats (this applying only to exhaust valves); the cylinders may be worn so the rings do not perfectly pack them, the cylinder walls may be scored by broken piston rings or loose wristpins, the piston rings may be broken, may have lost elasticity, the ring slots may be in line, the ring grooves may be filled with carbon

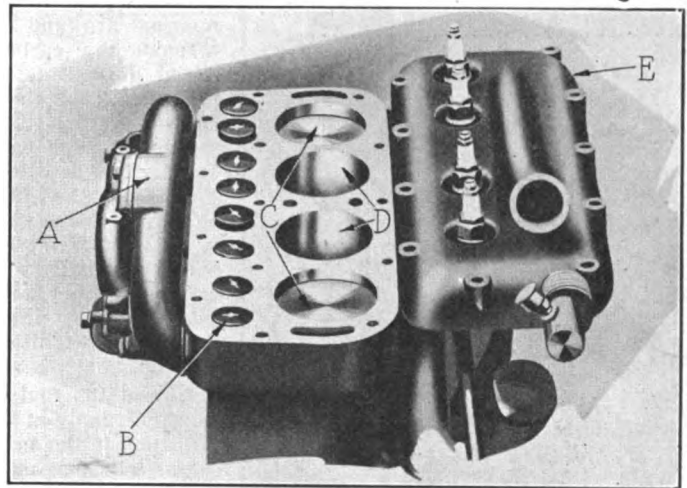
and prevent ring action, a piston may be cracked, or a cylinder wall may be cracked and water admitted to the combustion or expansion chamber. Still other causes are worn valve stems, worn valve guides, bent valve stems, weakened springs, or valve stems shortened by wear so that the valves open late and close early. In addition the fuel may be diluted by air leakage into the intake manifold at the gaskets. If the engine is not timed accurately the power will not be developed.

Much depends upon the valves functioning normally. There is more probability of the exhaust valves developing failure than the intake valves, for they are subjected to greater heat and may warp or distort, and carbon may accumulate on the valves or ports. Grinding may be a sufficient restoration, and this work requires much more careful work than is generally believed. Only sufficient metal should be removed from the valve or port to insure a seat of uniform width, but the perfect valve should seat the full width of the valve and port.

There are those who maintain that if the valve is seated the full circumference and 1/32 inch width it will retain compression; if the metal is bright the seat is insured. This is far from being the fact, however. The ideal valve is polished with a fine grinding compound until it has a glass finish. It will not be susceptible to carbon accumulations or pitting, and will serve from two to five times the mileage of the rough finished valve.

The polished valve requires more work to finish it, but the greater efficiency for the much longer period and the saving of fuel justify the time and the first cost of the work.

The ignition spark must occur at a precise point to develop the greatest degree of power. Primarily the spark plug electrodes must be set to obtain the exact spark gap. If the elec-



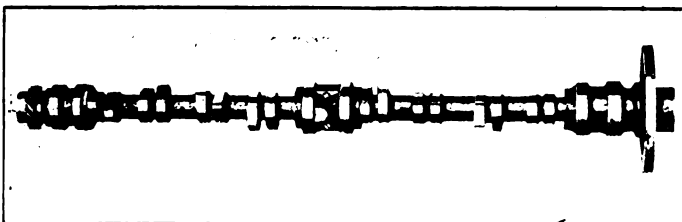
Typical En Bloc Engine Construction with Detachable Head, Four Cylinder Power Plant—A, Exhaust Manifold; B, Valve; C, Pistons; D, Cylinders; E, Detachable Head.

trodes are insulated by oil or soot the spark will not be made. One important fact of the law governing the attractive or repulsive force of magnetism is that it varies inversely with the square of the distance between poles. That is, if the space between two poles is increased 100 per cent. as from 1/16 inch to 1/8 inch, the intensity of the magnetic field is reduced from 100 to 25; if increased from 1/16 to 3/16 the intensity is reduced from 100 to 11. This ratio obtains with reference to the attraction of poles of unlike polarity. One can understand from this the reason why an extremely small variation in the spark gap of a spark plug will seriously affect the potency of the spark. If the electrodes are too close the spark will be weak and if too widely separated no spark may be made. Gauging the setting of the spark plug is the only certain way of obtaining accuracy.

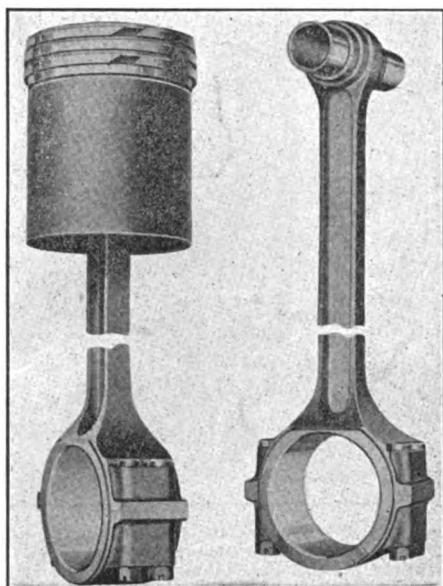
If the battery has been discharged excessively, if the magnets have become demagnetized, if the condenser is punctured, if the contact points of the magneto, timer or distributor have become pitted and if the setting of the contacts is not accurate, if the coils are defective, or if there are grounds, the current may be weak. Careful examination and test is the only certain way of determining the condition of an ignition circuit. If a cylinder does not fire regularly and a cause is not positively known, the spark plug should be disassembled and the insulation of the center electrode examined. It may be cracked or saturated with oil.

Carburetor adjustment is extremely important. A lean fuel will burn faster than a rich fuel. Generally speaking the least fuel possible should be burned, and it should be supplied as needed with the ignition spark as far advanced as is practical without the engine knocking. The richer the mixture the greater the heat created, and the slower the engine speed the lower the radiation. More compression is lost at low speed. When driven fast the engine compression is higher, as there is less leakage, and when a lean and highly compressed charge of fuel is fired the fuel economy is increased.

All carburetors will not be equally ef-



Camshaft of Apperson Eight Power Plant.



Piston Rings, Connecting Rods, Connecting Rod Bearings and Wristpin Arrangement of Marmion 34 Model.

ficient on all engines. There will be decided variance in efficiency of a single instrument if used with different engines. The quality of the mixture depends upon the volatilization of the fuel, which varies with temperature, upon the setting of the carburetor, upon the velocity of the current of air in the carburetor, upon tight intake manifold; and obviously it is varied with the speed of the engine.

The engine will inhaust at each suction stroke a volume of fuel equal to the volumetrical area of the cylinder, and this applies no matter what the number of revolutions a minute. But as the piston speed is increased, for the ignited gases expand so rapidly and the time of contact of the gases with the cylinder wall is so much reduced, that less heat is absorbed and diffused by the cooling system. The combustion of the fuel takes place regularly, the greatest effective pressure being obtained from the charge that is compressed highly before ignition. The combustion chamber of the high compression engine is small and less cooling is believed to be necessary. The ratio of energy in heat lost would appear to be more in low compression engines than in high compression engines.

When an engine is driven at high speeds the air current through the carburetor will take up more fuel than at low speeds, the ratio of fuel increase being considerably more than the speed increase. That is, the mixture constantly increases in richness. This is compensated by the adjustment of the main air gate, although in the Zenith carburetor this compensation is obtained by the use of a compensating jet.

The setting of the carburetor is an adjustment that should only be made by one who has experience. Theoretically the setting that will meet all requirements when the car is standing will not be accurate when the vehicle is driven and the normal efficiency of the cooling system is reached. Preferably the setting should be made with the engine well heated. The engine should idle at the

slowest speed that is practical without missing fire and the gasoline supply through the carburetor should be reduced until it is obviously too lean a mixture. Then the supply should be increased so that the engine will accelerate quickly and evenly. When the carburetor has both low and high speed adjustments, the former is made first, usually with the gasoline, and when this is satisfactory the latter is made, usually with the auxiliary air intake. What is mainly required is practically uniform acceleration from any position of the throttle with the ignition control in a fixed position.

To test the fuel mixture, shut off the gasoline supply at the tank and open the throttle. If the mixture is too rich the engine will increase speed as the level in the float chamber is lowered, which reduces the volume of gasoline in the fuel. If the mixture is believed to be too weak, flood the carburetor, and if the engine increases speed the belief is proven.

Other Losses of Power.

Air leaks at the intake manifold gaskets, or in the valve stem guides, will dilute the fuel, which cannot be compensated by carburetor adjustment, for the leakage is greatest when the least fuel is required, for the suction is strongest when the throttle is nearly closed. Weakened valve springs, so the valves are not fully seated, gases escaping past the piston rings or in the ring slots, or from scored cylinders, are probable causes that may be investigated.

The normal valve spring tension is about 30 pounds. Spreading the coils of a spring with the blade of a screw driver will somewhat increase its tension, and this is a practical test. A valve stem may become coated with carbon and stick in the guide. This should not be confounded with a weakened spring. The valve clearance is important. If too great the intake valve lift is reduced and the fuel inhausted is inadequate. If the clearance of the exhaust valve is reduced the expulsion of the gases is incomplete. Too great clearance causes the valves to open late and close early, but if the clearance is less than normal the valves will open early and close late, or not close.

Inaccurate meshing of the gears of the camshaft and crankshaft will entirely change the timing of the engine, and should there be necessity for removing the camshaft or crankshaft care should be taken to observe the gears for marks that indicate the teeth that should be meshed. If, however, the gears are not indicated, they should be marked with a punch or file. This will insure

against error when assembling.

Two conditions in addition to those previously stated ought to be given attention in the event of defective carburetion or lubrication, and these are obstructions in either the main fuel pipe or the main oil pipe. Another cause of lost power is a clogged exhaust pipe or muffler, or both.

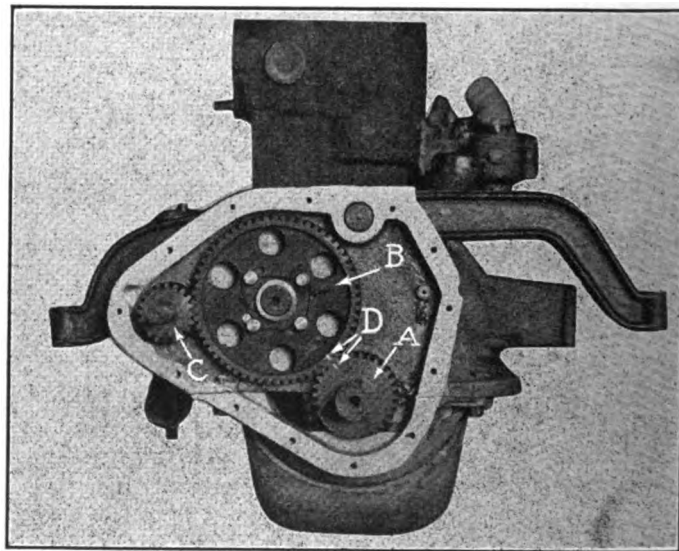
Abnormal Noise While Running.

The engine may cause sounds that are abnormal, such as pounding, knocking, metallic clinks, or hissing. The pounding may result from a loose flywheel, from play in the main bearings, either radial or end, and be either regular or intermittent. If the pounding is noted the condition of the flywheel and the main bearings should be determined.

If the knock is heard and the cylinders are free from carbon so that preignition is not probable, warm the engine by driving over a level a half mile in length, terminating in a grade of from eight to 12 per cent. Drive from 12 to 15 miles an hour on the level and continue this up the grade if possible. If the engine is quiet on the level and low metallic raps are heard from one to four times a revolution of the crankshaft, the valve tappets or push rods will be found to have too much play.

Should the knock be slight and increase as the grade is ascended, the cause is probably worn piston rings, or it may be worn pistons that slap the cylinder walls at each stroke. This knock may be decidedly metallic and occur once each power stroke and it may be increased as more fuel is supplied. In the latter event it may be from preignition.

If the knock is either heavy or light, and more or less muffled, happening from one to four times to two revolutions, depending on the number of cylinders, this will probably be a connecting rod or connecting rods, loose on the crankpins, or the play of the wristpins in the bushings, or the bushings may be worn considerably. The cylinder in which the knock originates may be located by holding down the coil vibrator or preventing the sparks at the plugs separately. By



Illustrating Timing by Punch Marks on Gears in Timing Gear Case—A, Crankshaft Gear; B, Camshaft Gear; C, Pump Shaft Gear; D, Timing Marks.

this is meant that if the firing of No. 1 cylinder is prevented and the knock ceases or the number is lessened, the connecting rod of No. 1 cylinder may be one of the causes.

If the engine pounds, similar to a block of wood striking the ground, and is heard every cylinder explosion, but perhaps heavier with some one cylinder, the cause is a crankshaft bearing. Sometimes the jar may be felt by the driver. A loose flywheel will cause approximately the same sound, but the crankshaft bearing pound will be two blows, almost simultaneously.

The knock caused by an advanced spark is more readily identified, since this is accompanied by loss of power. The retardation of the ignition will determine the cause. The six, eight and 12-cylinder engines are usually free from this condition, for the first type are ordinarily equipped with automatic spark advance that positions the ignition with reference to the speed, and the explosions of the eight and 12-cylinder engines overlap, so that knocks are not heard.

Knocks from Defective Carburetion.

If a knock develops and it is due to carburetion this can be determined by the sluggish operation of the engine. The condition of combustion can be determined by opening the compression relief cocks in succession and noting the color of the flame issuing from them. If yellow, the fuel is too rich; if deep blue, the mixture is good. Adjustment can be made by turning the needle valve of the carburetor slightly to the left with the ignition retarded. If the engine does not accelerate the fuel is too rich. Turn the needle valve to the right slightly and note the difference in operation. If it does not accelerate turn the needle valve still further to the right to a point where it does accelerate and idles on all cylinders. If this condition can be obtained and the engine will accelerate as the throttle is opened, the fuel is well carbureted, but if there is no response the air valve may need tightening. If the temperature is cold the air adjustment must be made much closer than if the air were warm.

Worn valve tappets or valve stems

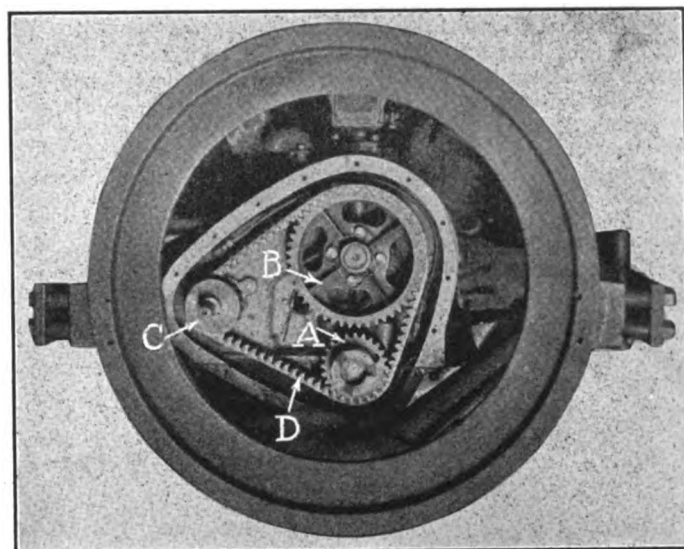
should be adjusted so that the clearance is not more than $1/32$ inch. This is the maximum, and it may be as small as $1/64$ inch. A reasonably safe adjustment is to $1/50$ inch. The clearance should be measured when the tappet is on the heel of the cam.

The slap of a piston in a cylinder is difficult to locate. It is caused by the piston striking one side and then the other, and the degree depends on the fit of the piston. The cause may be worn cylinders, or, as in the case of aluminum pistons, when the engine is cold, because of the contraction of the metal. The degree of wear can only be determined by examination, but the greater the play the louder the sound.

When making a compression stroke the piston contacts with one side of the cylinder, but as the crankpin passes the dead center the inclination of the connecting rod changes and the piston is thrown to the opposite side of the cylinder. When the cylinder fires the piston is forced downward with projectile-like force and the connecting rod strikes the crankpin heavily and the piston strikes the cylinder wall. The contact is unchanged during the remainder of this stroke, and at dead center the pressure is nearly atmospheric. On the exhaust stroke the piston practically floats until the top is reached, and there is no stress whatever during the suction stroke.

Knocks Caused by Hard Pulling.

When a machine is driven up a grade it is doing what is practically its hardest work, and knocks that are developed when ascending a gradient may result from a too lean fuel, magneto set too



Illustrating Location of Gears When Driven by Silent Chain and Sprockets—A, Crankshaft Gear; B, Camshaft Gear; C, Pump Shaft Gear; D, Chain Drive.

early, valves not seating perfectly, carbon accumulations, faulty valve adjustment, loose wristpin bushings, loose magneto shaft coupling, sticking valves. If the ignition is too advanced a knock will be caused. A knock and vibration will be caused by loosening of the bolts securing the cylinder block to the crankcase, a knock from end play of the magneto or pump shaft, while wear will result in general looseness that may cause noise that may be gener-

Defective Ignition.

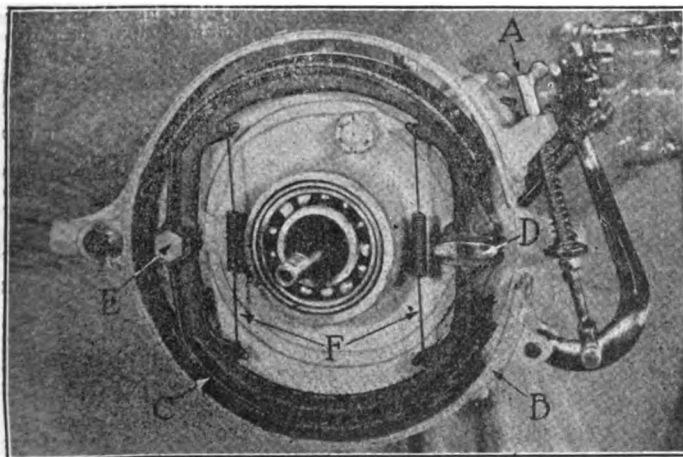
The condition of the spark plugs can be determined for individual efficiency by short circuiting them in order with a screw driver from the terminals to the cylinder block. The condition of each can be judged and if necessary can be examined, cleaned or replaced.

The spark plug electrodes should be set as before explained. The interrupter points, if magneto ignition, or the contacts of the breaker box, if a distributor is used, should be examined and set the same as the electrodes of the spark plugs.

Should the engine miss with a popping in the carburetor there is probability of too much cold air being admitted through the air valve, that the carburetor jet has been obstructed, or there is a reduction of the gasoline supply, possibly from an obstruction in the main pipe line. Examine the gaskets of the header coupling the carburetor, which, if leaking, might dilute the fuel.

Irregular firing of the cylinders might be caused by foreign matter in the well of the gasoline tank that partially obstructs the outlet, by dirt or water in the carburetor float chamber, by a leaky gasoline float, by a clogged carburetor jet, by a sticking inlet valve, by a leak in the inlet manifold, by weak exhaust valve springs, and these might possibly be found in combination. When an explosion is heard in the muffler after a cylinder has missed, the ignition is probably defective, for the fuel was not fired in the combustion chamber, but ignited after it had been exhausted.

When an engine fires regularly at low speed or when working hard, but misses at high speed, there is reason to believe, if the spark plugs are firing, that the contact screw in the magneto breaker box or the breaker box of the distributor head should be adjusted. An engine may fire normally at slow speeds because



Showing Mechanism of Emergency and Service Brakes—A, Service Brake Adjustment; B, Service Brake Band and Lining; C, Emergency Brake Shoe and Lining; D, Spreader to Open Emergency Brake Shoes; E, Hinged Joint of Emergency Brake Shoes; F, Spring Releases for Emergency Brake Shoes.

the contact of the points is of such length the coil will build the voltage, but as this time is reduced at higher speeds adjustment of the screw is necessary. In the event of dual ignition both systems should be tried to determine if a defect exists.

When a carburetor has been adjusted for slow speeds, if driven fast the necessary fuel mixture may not be supplied; or the fuel may be too rich. Adjustment of the carburetor will improve the condition.

Should an engine misfire at low speed, if the ignition is by magneto, this may

be due to a weak current; if the ignition is from a battery the battery may be nearly exhausted. The spark can be advanced and the condition of the interrupter points determined. A defective coil or a loose terminal may be a cause.

The condition of the spark plugs can be learned by short circuiting them and if defective they can be cleaned or replaced.

When there is doubt of the quality of the fuel the slow speed adjustment may be tested. A low float will cause too rich fuel to be supplied.

A very common cause of misfiring at

slow speed is a leaking intake manifold. This can be determined by letting the engine run as nearly as possible at the same speed and inject gasoline into the joints of the manifold. If the engine increases speed the leak is located. If a flange of an intake manifold has been cracked it may be repaired by welding.

When an engine misfires at all ranges of speed the cause may be defective spark plugs, loose terminals, weak battery, loose switch parts, a broken wire, a short circuit or the carburetor may be clogged or need adjustment.

Troubles of the Power Plant

Condition.	
Overheating, water dissipated.	
Overheating.	
Overheating.	
Overheating, squeaking, grinding noise.	
Overheating, due to friction.	
Overheating due to friction.	
Overheating.	
Overheating.	
Overheating, grinding or dull squeak, dull humming.	

Condition.	
Loss of power, hissing sound.	
Preignition, loss of compression.	
Loss of power, knocks.	
Loss of power, hissing.	
Loss of power, clicking.	
Loss of power, valve not closing, rattle or clicking.	
Loss of power.	
Loss of power.	
Loss of power.	
Loss of compression, gas blows by piston rings, hissing sound.	

Condition.	
Sharp metallic knock.	
Dull metallic knock.	
Intermittent metallic knock, squeaking.	
Distinct knock.	
Metallic knock, squeaking.	
Sharp knock.	
Knocking.	
Very sharp knock.	
Sharp pound.	
Knocking.	
Knocking.	
Grinding sound.	

OVERHEATING.	
Cause.	
Water pipe loose.	
Water jacket, radiator and pipe clogged.	
Poor grade of oil, causing friction between pistons and cylinder walls.	
Carbon in ring grooves, insufficient opening at ends of ring, binding on cylinder walls, defective oiling.	
Crankshaft main bearings adjusted too tight, babbitt burned out of boxes, faulty lubrication.	
Crankshaft scored or rough at bearings, sprung.	
Fan belt loose or broken.	
Oil in reservoir low, poor grade of oil, sediment in oil reservoir.	
Piston binds in cylinder, walls scored, worn out of round, side slap.	

LOSS OF POWER.	
Cause.	
Priming cups leak at bore or gaskets, priming cups leak at bore or fittings.	
Combustion chamber cracked, blow hole in casting, carbon, rough or sharp edges.	
Piston head cracked, carbon deposits.	
Leak around valve cap, leak at gasket.	
Valve head warped, scored or pitted; covered with carbon or scale; loose on stem (two-piece valve).	
Valve stem covered with carbon, stem bent, binds in guide, stuck in guide, loose in guide.	
Valve seat warped or pitted, coated with carbon that prevents seating.	
Wristpin loose, scores cylinder.	
Cylinder wall scored, gas leaks past piston rings.	
Loss of spring tension, loose in grooves, scored, worn or broken, slots in line.	

NOISY OPERATION.	
Cause.	
Cylinder base retaining bolts loose, piston strikes at upper end.	
Wristpin loose in piston.	
Connecting rod bearings loose, excessive end play, adjusted too tight.	
Connecting rod worn in upper bushing, wear at crank pin, side play in piston.	
Main bearings loose, defective lubrication.	
Connecting rod and main bearing bolts loose.	
Lower half crank case bolts loose.	
Flywheel loose on key of crankshaft, retention bolts loose.	
Engine base loose on frame.	
Overheating, water jacket clogged with sediment, walls covered with scale.	
Overheating, water pipe leaks, loss of water, clogged with sediment.	

Cylinder and piston dry of oil, poor lubricant.	
---	--

Restoration.	
Replace gasket, tighten bolts.	
Fill with solution of half pound of sal-soda to five gallons of water; run engine half hour; flush with fresh water several times.	
Supply right grade of oil.	
Remove carbon deposits, file ends of ring, file grooves, supply sufficient oil.	
Adjust, renew babbitt, clean out oil ducts and tubes and supply right grade of oil.	
Smooth off scores and roughness, straighten shaft.	
Adjust or replace belt.	
Replenish oil supply, supply right grade of oil, clean and flood reservoir.	
Lap off excess metal, replace with new parts.	

Restoration.	
Seat tighter, replace gaskets or renew plugs, seat tighter, grind fittings to new seat.	
Weld casting, clean carbon, remove rough or sharp edges.	
Weld casting, remove carbon.	
Remove and refit with pipe compound, replace gasket.	
True valve or replace it, regrind seat, remove scale, re-rivet head.	
Scrape or polish clean, tighten, free with kerosene, replace guide.	
Reseat valve, clean and grind to seat.	
Tighten securely, replace cylinder if score is deep or refill by plating process.	
Rebore cylinder or fill scores by plating process.	
Replace or peen ring, fit new rings, lap smooth, replace rings, turn rings to stagger slots.	

Restoration.	
Tighten bolts, smooth edges at top of piston.	
Replace with new pin and fasten securely.	
Adjust bearing caps, put in longer bushings, insert shims to allow more clearance.	
Adjust or replace with new part, scrape to fit, use longer wristpin bearings.	
Refit bearings closer to shaft, clean oil-ways.	
Tighten bolts.	
Tighten bolts.	
Refit key and keyway, tighten bolts.	
Tighten bolts.	
Dissolve scale and flush out with water under pressure.	
Fill with water, clean sediment with hot water and sal-soda, one-half pound to five gallons of water, flush with clean water and refill.	
Replenish oil and repair oil system, supply right grade of oil.	

Grinding or squeak in all bearings.
Squeaking sound.

Clicking sound.
Clicking sound or rattle.
Clicking or grinding sound.
Sharp whistling sound.
Sharp hissing sound.
Blowing sound.
Valve sticks, irregular action, rattle or clicking.
Valve lift short, rattle or clinking noise.

Poor valve action, clicking sound, blow-back in carburetor.
Irregular valve action, metallic knock or rattle, grinding or humming sound.

Valves do not open properly, slight knock.

Oil reservoir too low, poor lubricant.
Crankshaft oiling system defective.

Valve push rod retention stirrup loose.
Fan blade loose, striking radiator.
Fan hub bearing ball broken.
Intake manifold joints leaking.
Exhaust manifold joints leaking.
Crankcase packing leaking.
Valve stem guide burned or rough, loose in valve chamber, worn or loose.
Valve tappet loose in guide, too great clearance between valve stem and tappet.
Valve lift cam worn, loose on shaft, out of time.
Camshaft driven gear loose, out of time, worn or broken, teeth meshed too deep, fiber gears swelling.
Camshaft bushings worn or loose.

IRREGULAR OPERATION.

Cause.

Blow back, compression relief cock leaks at threads or spigot.
Spark plug leaks at threads, defective gasket, cracked insulator, points too close, too far apart, carbon deposit on points.
Valve chamber caps leak in threads, defective gasket.
Valve head warped or pitted, loose on stem.
Valve seat scored or warped, cracked, covered with scale, dirt under valve.
Intake manifold leaks at joints, crack or blow hole in manifold.
Exhaust valve opens too late, opens too early.
Inlet valve stem guide worn.
Combustion chamber filled with carbon accumulation.
Piston head covered with carbon deposits, crack or blow hole (rare).
Valve stem binds in guide, sticks.
Valve stem bent or carbonized.
Valve spring weakened or broken.
Inlet valve closes too late, closes too early.
Valve spring weak, broken.
Valve stem clearance too small, too great, adjusting screw stripped.
Valve spring collar key broken.
Cams worn out of contour, cams out of time.
Camshaft bearings loose or worn.
Camshaft twisted.
Valve tappets loose in guide.
Valve tappet guide worn in bore, loose on engine base.
Timing gears not properly meshed.

Timing gears loose on shaft.
Loss of tension in piston rings, too loose in groove, worn or broken.
Cylinder wall scored by wristpin, lack of oil.

Refill with right grade of cylinder oil.
Clean oil ducts and tubes, supply fresh lubricant.

Tighten retention nuts.
Re-rivet, bend blades clear of radiator.
Replace with new ball.
Supply new gaskets.
Tighten nuts or supply new gasket.
Supply new packing and tighten bolts.
Ream bore of guide, tighten guide.

Replace valve, adjust clearance.

Replace cam and shaft, retime correctly.

Tighten securely, time correctly, replace with new gears, adjust correctly, replace with new steel gears.
Replace with new bushings.

Restoration.

Grind spigot to a seat with emery and tighten.
Screw down tighter, replace with new gasket, adjust points 1/64 inch apart for magneto, 1/32 inch for battery or generator, remove carbon deposit.
Remove caps, apply pipe compound to threads, replace and tighten, replace gasket.
Replace valve, re-rivet head.

Reseat with reseating tool, clean scale and regrind valve to seat.
Tighten joints, fill with solder or braze.

Retime properly.

Rebush guide or insert new part.
Burn out or scrape to remove carbon accumulation.
Remove carbon by burning or scraping, replace with new piston.
Ream out guide.
Straighten stem, remove carbon.
Replace with new spring.
Retime correctly.
Strengthen spring, replace spring.
Adjust gap .005 inch inlet, .008-inch exhaust, replace adjusting screw.
Replace with new key.
Replace with new camshaft, retime.

Replace with new bearings.
Straighten or replace with new.
Replace with new tappet.
Replace with new or rebush, tighten stirrups securely.
Remesh properly, according to punch marks on face of gears.
Tighten to shaft.
Peen rings or replace with new, fit new rings.
Rebore or refill by plating process, secure wristpin.

Condition.

Mixture diluted with air.

Mixture diluted, allows short circuit at plug.

Dilutes mixture during suction stroke, allowing air to enter combustion chamber.

Mixture diluted with air or gas.

Mixture poor, due to gas leak, valve held open, poor compression.

Mixture diluted by excess air.

Mixture diluted by burned gas.

Mixture thinned at suction stroke by air.
Preignition.

Preignition.

Valve action irregular.
Valve action irregular, sticks.
Valve action irregular.
Back fire in carburetor.
Valve not closing, blow back in carburetor.
Valve will not close, opens early, closes late.
Valve spring releases.
Valve lift reduced, operates out of time.

Valve timing altered, decreasing valve lift.
Valves out of time.
Valve timing altered.
Valve timing altered.

Valves out of time.

Valves do not operate.
Leakage, weakens suction of new gas.

Leakage, weakens suction of new gas.

PROTECTING AUTOMOBILE SPRINGS FROM FOREIGN MATTER.

The leaves of an automobile spring are intended to slide upon one another when the car is in motion. Many motorists allow their springs to collect dirt, to go without lubrication, and to become rusty. The leaves become so dirty that instead of sliding on each other they work almost as if they were one solid piece of steel. When the car strikes a hole or a bump in the road, the springs are compressed and instead of each leaf working as a separate unit, the lower leaves of a rusty spring are held fast to the upper leaves and the reaction from the compression of such a spring is many times greater than the reaction of a clean, well lubricated spring where the leaves are allowed to slip one on the other.

The first step towards a remedy is to keep mud and dirt and all foreign matter away from the springs. This can be

done by covering them with boots, sewed together, made of a good grade of leather substitute. This material is claimed to be thoroughly water proof and will keep dirt and moisture away from the spring. The lubrication on springs protected in this manner will remain in place for some time and as it cannot readily leak away, will not gather dust or cause undue friction of the leaves. Boots similar to the above may be purchased ready made or the material may be purchased, cut to fit and sewed on the ordinary sewing machine or laced with stout lacing. Leather substitutes are obtainable in many department stores and at all automobile trimming shops and jobbers of automobile and upholstery fabrics.

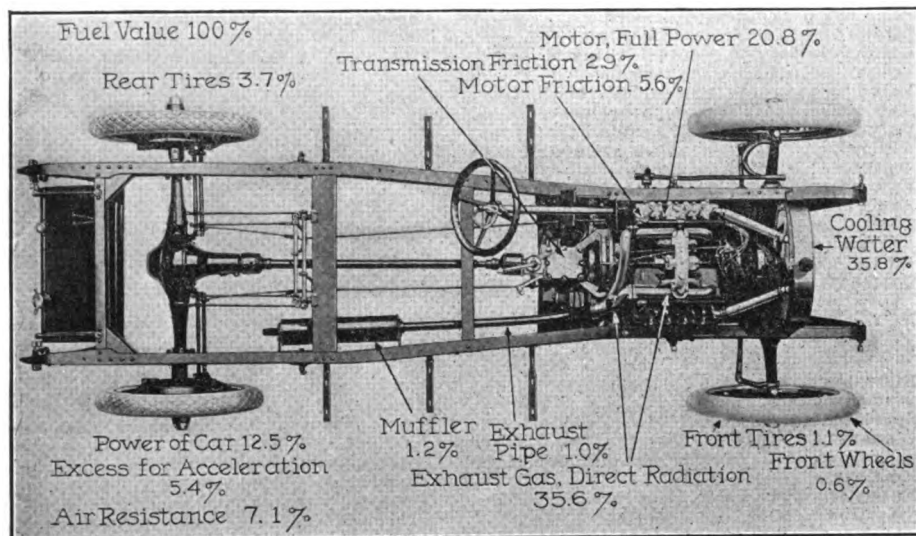
If one does not care to make use of the leather substitute, the springs may be wound with heavy cord, using a grade that is recommended for its strength. Lay a length of cord the full length of the spring to be laced and cross the first

layer of cord over this straight length, then bring the next layer under the cord and each successive layer over the cord till the end of the spring is reached, then tie the ends with a hard knot. Have the layers as close together as possible, so that moisture will cause them to swell and close up any small openings between them. Dust or dirt cannot work through the coils and the lubricant will have a tendency to stay between the leaves.

TO FINISH WOODEN HANDLES.

Wooden handles, etc., may be finished to preserve them by soaking the articles to be finished in linseed oil for a week or so and then giving them an occasional rubbing at intervals of a day or two till the desired polish is obtained. This preserves the wood and gives a natural finish that many consider greatly superior to the usual artificial colorings and finishes.

What Becomes of Fuel and What Reserve is Left for Unusual Demands



Illustrating Percentage of Useful Work Realized from Given Volume of Fuel Expressed in Thermal Units.

MOST owners of automobile vehicles are interested in the fuel they buy and with rare exceptions they assume to know what is referred to as average consumption. That is, they will state positively that they can drive a specific number of miles with a single gallon of gasoline. Some will boast of assumed small consumption, just as others will complain of what is regarded as extremely small mileage.

As a matter of fact there is no standard by which consumption can be measured other than comparison of what is obtained by owners of cars of the same make and capacity, and even then much depends upon the owner or driver. One man may be very well experienced, driving with the least fuel necessary, and another may drive with no knowledge of fuel conservation. The judgment of the drivers is not the ordinary basis for determination—the one using the largest volume of fuel criticises the vehicle and believes himself right from every point of view.

The internal explosion engine is not generally more efficient than the steam engine so far as the realization of power from fuel consumed is concerned. Tests of engines in laboratory determinations have proven that operated by experts they will be more efficient from some angles, but this efficiency will reduce gradually until restoration by adjustment or overhauling is necessary, and taking the average, and considering the experience and judgment of those operating them, there can be no reason to claim material economy in fuel value.

Thermal Value of Fuel.

The thermal value realized from coal in the steam boiler depends upon the design of the boiler, the quality of the coal and the judgment of the engineer or fireman. The thermal value realized from gasoline depends upon the quality of fuel, the degree of carburetion and the condition of the engine.

The most economical use of fuel is

when it is so carbureted that it will be entirely consumed. There is a wide range of proportions of gasoline vapor and air that are combustible, but unless these two elements are mixed so they burn practically without residue, the full value of the fuel is not obtained, and this is reflected by reduced power or large consumption or both. As the gasoline is supplied through a carburetor the instrument must be set or adjusted, and this setting depends upon the quality of fuel, the temperature, the lubrication and condition of the engine and the efficiency of the electrical ignition apparatus.

Carburetor Adjustment Important.

The adjustment of the carburetor is a very delicate operation—in fact, far more delicate than is believed. This work is

practically a matter of judgment, for the worker must determine just the point when the engine is doing its best, and this must be done when the machine is standing either in the garage or on the road. As the efficiency of the cooling system will improve with the movement of the vehicle the determination while standing may not be specially efficient when moving, for the temperature may be considerably reduced, and any stop will cause the engine to heat and the precise setting that will be best while driving is rarely obtained.

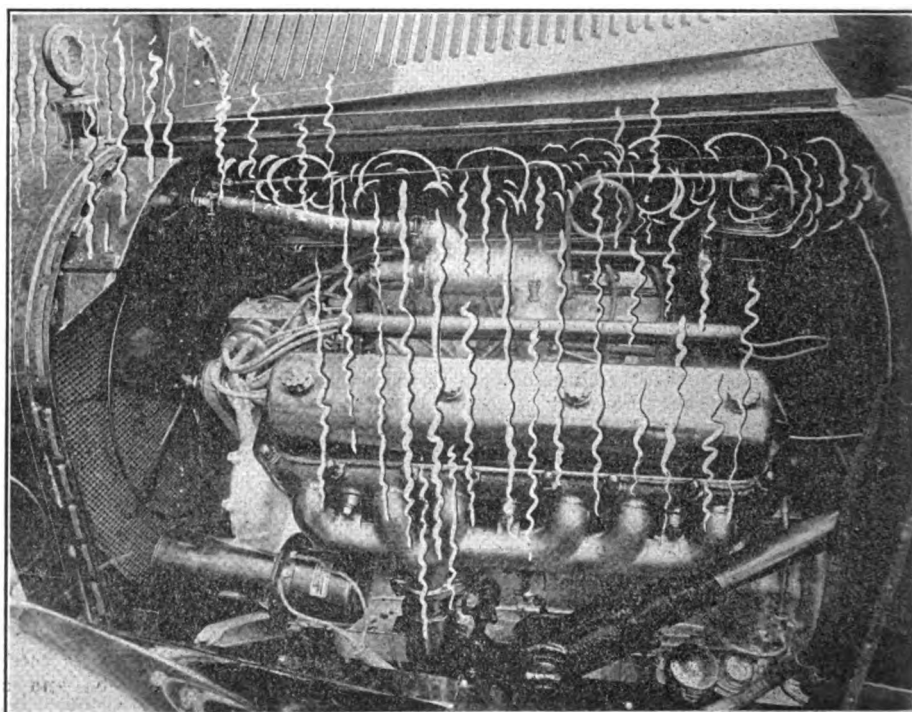
The ignition system will be a potent factor, and this will include every element from magneto or timer or distributor to the spark plugs. Each of these must be operative to the standard of efficiency. The engine has been assumed to be in normal condition, but the lubricant will be more effectively distributed if the machine has been heated, and this in turn is influenced by the cooling system. If the valves leak, air is admitted through the manifolds, the spark plugs, the valve caps, or the fuel is diluted in any way; if the lubricating system is defective, if the engine is worn and there is lost motion and excessive friction, the power output is more or less reduced.

How Engine Power is Determined.

The owner or driver may be impressed with the efficiency of an engine which, for the purpose of illustration, may be assumed to develop 30 horsepower at maximum by brake test, which is the best indication obtainable. He does not understand that the test is made with the engine out of the chassis. The power appears much in excess of any ordinary requirement.

Yet to obtain this 30 horsepower fuel is consumed that, were its entire thermal value realized, would develop approximately 150 horsepower.

And this rating of 30 horsepower does



Showing Power Plant (Direct Radiation)

Cooling System (Indirect Radiation.)

not mean 30 horsepower available for useful work; that is, delivered in actual tractive effort at the road wheels. The power actually delivered is approximately one-eighth of the thermal value of the fuel consumed.

This leaves as available for useful work at the road wheels but 12.5 per cent. of the thermal value of the fuel. This is approximately 18.75 horsepower. The resistance of the air against which the vehicle must be driven requires no less than 7.1 per cent. of the total fuel value, or really 56.8 of the actual car power, and this leaves 5.4 per cent. of the total fuel value, or 43.2 of the actual car power for acceleration, climbing hills, driving through soft surfaces, etc.

The Various Causes of Power Loss.

Assuming a thermal value of a gallon of fuel as 100 the losses, as determined by extremely careful experiments, are the following, expressed in terms of percentage:

Engine friction.....	5.6
Cooling system (indirect radiation) 35.8	
Direct radiation, exhaust, etc.....	35.6
Exhaust pipe.....	1.0
Muffler	1.2
Loss in the engine.....	79.2 79.2
Power transmission system friction	2.9
Rear tire adhesion or friction....	3.7
Front tire friction.....	1.1
Front wheel friction.....	0.6
Loss in transmission to road wheels	8.3 8.3
Total loss in engine and transmission	87.5

By this one realizes that of the gallon of gasoline consumed in the engine a very small part is converted into useful work. But even this value may be materially lessened by neglect that will reduce engine efficiency.

DIRT IN BRAKE LINING.

Squeaking brakes are an annoyance to operators of passenger cars and trucks and are many times caused by dirt or grit becoming embedded in the lining and pressed against the brake drum when the brakes are operated. Usually this dirt may be washed out with kerosene, but if it is so firmly entrenched that it will not come out with this treatment a little rosin mixed with castor oil and applied to the bands will cure the trouble.

CAUSE OF CLUTCH SPINNING.

Clutch spinning is often due to excessive friction in the spring thrust bearing, though some times faulty alignment of the flywheel and clutch cone prevents the engaging surfaces from entirely clearing each other. A bent clutch shaft might also cause this trouble.

SODA ON BATTERY TERMINALS.

A medium for cleaning corrosion accumulating on battery terminals is a strong solution of washing soda. After the terminals have been washed clean and dried they should be coated lightly with vaseline to prevent a return of the corrosion trouble.

Timing the Valves of the Ford Engine

THE method of accurate valve timing on a Ford model T engine is to time the valves by the piston travel according to the measurements given below.

On cars previous to 1913 model:

Exhaust opens $\frac{3}{8}$ inch before bottom center.

Exhaust closes $\frac{1}{64}$ inch past top center.

Intake opens $\frac{7}{64}$ inch past top center.

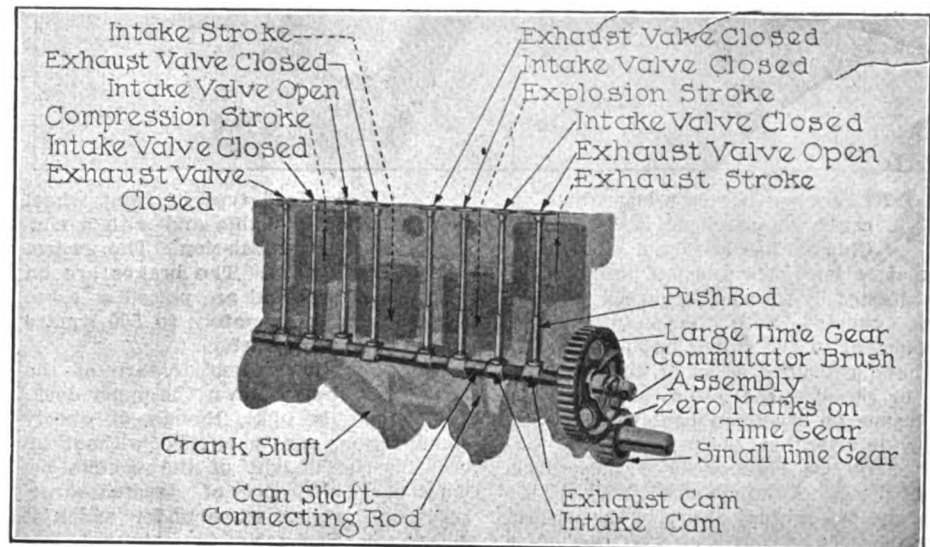
Intake closes $\frac{3}{8}$ inch past bottom center.

Later than 1913 models:

Exhaust opens $\frac{5}{16}$ inch before bottom center.

der block and the bottom center is $4 \frac{5}{16}$ inches, $3 \frac{11}{16}$ inches below the face of the cylinder block. On the 1913 engine the exhaust opens at a point $3 \frac{11}{16}$ — $5 \frac{1}{16}$ — $3 \frac{3}{8}$ inches below the face of the cylinder block on the down stroke of the piston, the crank shaft turning in the direction of rotation of the engine and closes $\frac{5}{16}$ inch to $\frac{1}{16}$ — $\frac{1}{16}$ inch— $\frac{1}{4}$ inch above the face of the cylinder block on the down stroke, and closes $3 \frac{11}{16}$ inches— $\frac{9}{16}$ inches— $3 \frac{3}{8}$ inches— $3 \frac{3}{8}$ inches below the face of the cylinder block on the up stroke.

The method of determining when the valves open and close is as follows: With the spring assembled, close the valve.



Cylinder Assembly Without Head Showing Correct Positions of Valves with Timing Gears Correctly Set and Relative Positions of Pistons in Their Strokes as Indicated.

Exhaust closes top center.

Intake opens $\frac{1}{16}$ inch past top center.

Intake closes $\frac{9}{16}$ inch past bottom center.

The piston of the cylinder being timed is first brought to top center, the highest point to which the piston rises. A scale is then laid across the piston and the distance from this scale to the top of the cylinder is measured. The engine is then turned to bottom center and the distance from the piston to the top of the cylinder block is measured again. This is the bottom center. For example, the top center is $\frac{5}{16}$ inch above the face of the cylin-

der block and the bottom center is $4 \frac{5}{16}$ inches, $3 \frac{11}{16}$ inches below the face of the cylinder block. On the 1913 engine the exhaust opens at a point $3 \frac{11}{16}$ — $5 \frac{1}{16}$ — $3 \frac{3}{8}$ inches below the face of the cylinder block on the down stroke of the piston, the crank shaft turning in the direction of rotation of the engine and closes $\frac{5}{16}$ inch to $\frac{1}{16}$ — $\frac{1}{16}$ inch— $\frac{1}{4}$ inch above the face of the cylinder block on the down stroke, and closes $3 \frac{11}{16}$ inches— $\frac{9}{16}$ inches— $3 \frac{3}{8}$ inches— $3 \frac{3}{8}$ inches below the face of the cylinder block on the up stroke.

When closed, hold with the fingers. Twist back and forth on the head while some one cranks the engine slowly. The instant the valve will turn it has started to open. In the same manner the valve may be closed, the valve turning until it has seated.

Still another way to check the opening and closing is to insert a .001, or less, feeler, or a thin sheet of paper, between the stem and push rod. The instant the feeler will not move the valve has commenced to open. The instant it will move after being held tight indicates that the valve has closed.

SAWDUST TO EXTINGUISH FIRES.

It is not generally known, but sawdust is a really effective agent for putting out fires such as are likely to occur in a garage. The sawdust floats on top of the burning oil or gasoline and tends to exclude the air. By soaking baskets of sawdust with bicarbonate of soda the effectiveness of the sawdust is increased. As an added precaution in addition to the regular equipment of fire extinguishers the sawdust is both cheap and good.

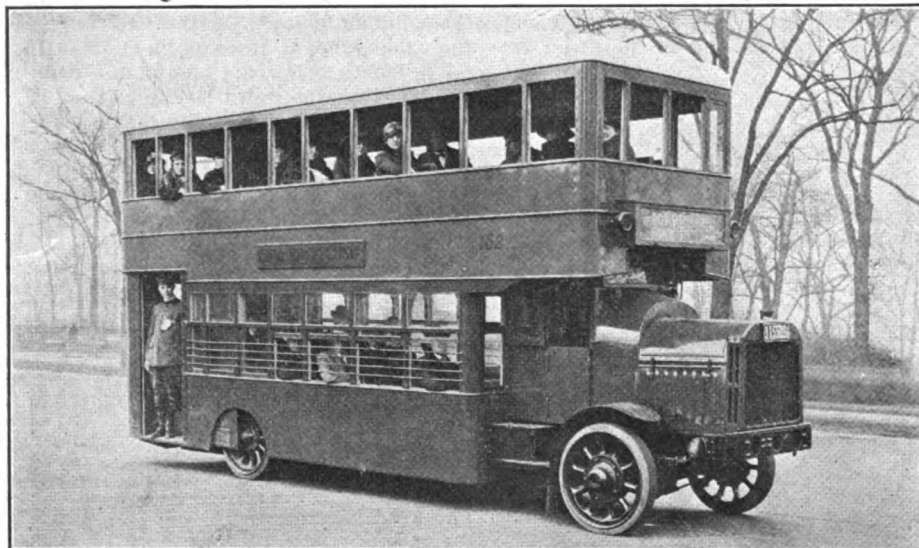
In making use of hand extinguishers where a fire is caused by burning gas from gasoline, do not allow the full force of the liquid to be squirted directly into the fire, but spray it above the fire, allow-

ing the heavy gas given off by the liquid a chance to settle and act as a blanket to smother the fire. If squirted into the fire directly the force of the liquid will have a tendency to spread the gasoline and increase the size of the fire.

FROSTING GLASS.

A good frosting for glass, such as headlight glass and bulbs, that imitates ground glass quite well, is made up of the following: Sandarac 18 parts, mastic four parts, benzol 40 parts and ether 200 parts. Clean the glass thoroughly before applying and apply by pouring the mixture on the glass, allowing it to flow evenly.

New Type of Chicago Motor Bus Has a Glass Enclosed Upper Deck



A NEW type of motor bus which recently appeared on the streets of Chicago has attracted almost universal attention; unusual interest is manifested by transportation officials and this, coupled with the unanimous indorsement of the riding public, is bound to have a decided effect on the future of motor bus transportation. Its first appearance on Michigan boulevard attracted wide attention, the principal new feature being the glass-enclosed upper deck. There was an immediate rush for the bus and the mutual desire of the passengers seemed to be to sit "on top" on a cold day and view Lake Michigan with its chilly winds with the same comfort heretofore enjoyed only in summer weather.

In reality the new bus differs but slightly from those previously in use. Like the older type bus it has the front wheel drive, the floor level with the curbing for convenience and speed in taking on and off passengers and the covered straight stairway, which is safer than the winding and exposed one. The actual difference lies in the glass-covered top, which permits the same temperature on the upper deck as on the lower floor and in the increased seating capacity; the new bus seats 60 passengers instead of 50 as in the older type vehicle.

The principal element in the construction of the new vehicle is a steel under-frame, and a body built of wood, aluminum and steel.

The length of the car is 25 feet, the width seven feet six inches; height from roadway when unloaded 12 feet 11 inches and 12 feet eight inches when filled. The wheelbase is 176 inches; height of lower deck from roadway 12¾ inches. Both decks are lighted brilliantly by a generator driven by the engine. The vehicle is heated by exhaust gases from the engine, which pass through pipes placed near the floor in the lower interior of the car. The front tires are of the six-inch single type, while those in the rear are double and have a total tread of 12 inches. The power unit is the American

Bus Co.'s standard type of front wheel drive, made detachable and with a constant mesh transmission. The worm drive also is used. The brakes are on the rear wheels and are placed so as to be applied approximately to 500 square inches of braking surface.

However, the salient feature of the new bus is the roof over the upper deck. This cover is light, though of sturdy construction, and is applied without increasing the height of the vehicle beyond easy clearance of elevated structures and trolley wires under which it must pass. Because of the extremely low level of the upper deck the center of gravity in relation to the roadway is very low, thus obviating all possibility of swaying unpleasantly.

The stepless feature, made possible by the front wheel drive and low hung body, allows the passenger to enter or leave the bus directly from the surface of the sidewalk. The only steps in the vehicle are those which lead to the upper deck. This stairway is so constructed that it gives a firm, wide tread and does not wind, making the ascent or descent easier and safer. The steps are enclosed, so there is no danger of accident if the vehicle starts or stops while passengers are on the stairs. There are 41 windows, 15 on the lower and 26 on the upper deck, thus affording practically an open vehicle during pleasant weather. All of the seats are commodious and those on the upper deck may be occupied all winter long or in the warmer months on windy or wet days.

On account of its increased carrying capacity and possibility of continuous operations under all sorts of climatic conditions, the new bus affords advantages not only to the operators, on account of its augmented earning possibilities, but also from the viewpoint of public utility, as it tends to minimize the probability of traffic congestion.

The average for the 6,146,000 automobile in use in the United States is valued at \$1000 each.

WORLD'S ONE-HOUR RECORD BROKEN.

A new world's motor car record for one hour was broken at Sheepshead Bay, N. Y., Nov. 25, by Tommy Milton, driving an eight-cylinder, 300-inch Duesenberg. The distance made was 113.5 miles.

The trial was conducted on the two-mile board track under the rules and with the sanction of the American Automobile association. The day was cold and a high wind was blowing, which were not ideal conditions for the run. This distance breaks the foreign record of slightly over 112 miles an hour made in a 12-cylinder Sunbeam of considerably greater displacement.

On Nov. 24, Milton and Lewis, on the track at the same time, each driving a 300 cubic inch Duesenberg, set new marks for all distances from 30 miles to 300 miles, including the two and three-hour. The trial on the 25th completed the series of tests which the American Automobile association has been conducting for F. S. Duesenberg, and gives this designer's car all the high marks for 300-inch cars up to 300 miles, including the one, two and three-hour records; also new marks for the 450-inch and 183-inch classes.

Following are the times for Milton's record-breaking hour run:

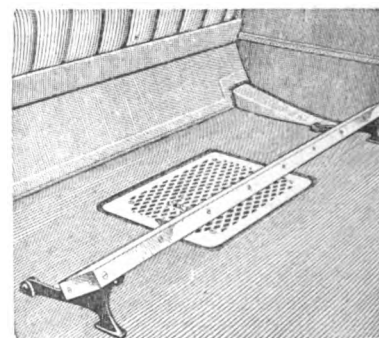
Miles	Time M. S.
20	10:42.2
40	21:12.8
60	31:40.6
80	42:16.8
100	52:43.6
113.5	60:00.0

The new marks established Nov. 24 by Milton and Lewis were as follows:

Distance Miles	Time H. M. S.	Driver
30	0:15:41.60	Milton
40	0:21:02.00	Milton
50	0:26:21.80	Milton
100	0:52:41.40	Lewis
150	1:19:38.20	Milton
200	1:48:38.40	Milton
250	2:14:49.80	Milton
300	2:44:15.40	Milton
2 hours	222 miles	Milton
3 hours	323 miles	Milton

THE PERFECTION HEATER.

The Perfection Heater & Manufacturing Co., 6545 Carnegie avenue, Cleveland, O., has brought out for this season's use the Type A Perfection Heater, with which a number of manufacturers are equipping their lines.





COMPRESSION PRESSURES.

(D. B. M., Hartford, Conn.)

Why are some engines designed with a compression of but 87 pounds, while others of racing type are designed with compression of 105 pounds? Why will the high compression engines function without knocking when the lower compression engines will knock from "over compression" when climbing a grade?

Please describe the method of finding the compression in pounds per square inch with a pressure gauge?

What should be the compression in pounds of a Teetor 3 $\frac{3}{8}$ by five-inch engine?

Have a 1919 car using an engine of that make which does not show the power that it should. Valves have been ground, carbon removed and connecting rods taken up. Have tried a number of carburetor adjustments, but the engine does not take me over the tops of grades, as it will not take the gas unless it knocks. The carburetor is a hot air heated type of Tillotson with a 1 $\frac{1}{4}$ -inch connection to the manifold. On the level the car shows 35 miles and that seems to be the limit of speed.

How much radial play should there be in a propellor shaft?

Do you believe a better carburetor than the one now on the engine could be found and if it would be advantageous to change?

The object of high compression engines is to obtain more power from a given volume or the same power with a smaller volume, assuming a definite standard is to be developed. Increase of engine temperature 100 degrees Fahrenheit has in test shown a fuel economy of 10 per cent. and efficiency is further increased by the velocity of expansion of the burning gases. By increasing the piston speed a higher fuel efficiency results. The ignited gases expand so rapidly and the time of contact with the cylinder wall so short that less heat is absorbed and diffused by cooling and radiation. If this heat is not diffused it is available for useful work. The loss of heat units would appear to be less in high compression engines than in low compression engines. Economy of fuel and greater power is the reason for the high compression engine.

The compression of engines is not variable, and for that reason there can be no such a condition as "over-compression." The engine knocking when climbing grades is due to another cause, possibly ignition advance or ignition defect; perhaps to diluted fuel from air leaks, or poor lubrication or carburetion.

A pressure gauge of standard make, screwed into a spark plug or compression relief cock bore will indicate the degree of compression of each cylinder tested. The engine is turned by hand to make the test. Comparison of readings will determine whether or not the compression is uniform.

The brief description of the car specified led to the supposition it might be a Pilot 6-45 1919 machine. The Pilot Motor Car Co. state that the 6-45 engine should have from 75 to 80 pounds compression in best condition. The work done on your car has not completely restored it. Better take it to the nearest service station that sells its make and have it inspected and adjusted. Then do not change the adjustments of the carburetor or the ignition.

There should be no radial or side play of a driving shaft in the bearings. There will be telescopic action at one end to compensate for the varying angularity of the shaft with spring compression and recoil, and the spring action will depend on the load carried.

FULL SPRING ACTION

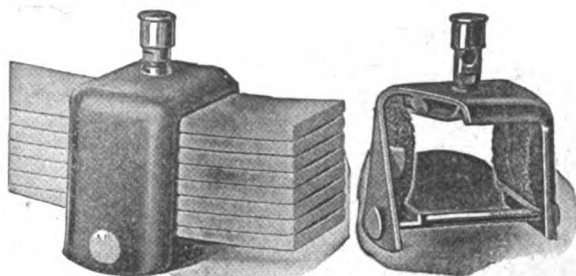
Absorbs all road shocks
Protects chassis mechanism
Insures riding comfort
Increases fuel and tire mileage
Decreases operating and maintenance cost

Spring Rusting Is Certain

It is the greatest and most general cause for car deterioration.

BROWN SPRING OILERS

Are a positive protection of any automotive vehicle. They contain oil reservoirs that automatically lubricate the springs to the exact degree that will insure full resiliency.



Can be installed by any owner. Sold by all dealers with ironclad guarantee of satisfaction.

Booklet on car and spring care sent at request.

Brown Spring Oiler Company

6913 CARNEGIE AVENUE, CLEVELAND, OHIO

Tarvia

PREVENTS DUST
PRESERVES ROADS

Booklets on Request

THE BARRETT COMPANY

New York Chicago Philadelphia Boston
St. Louis Cleveland Cincinnati
Pittsburgh Detroit Birmingham Kansas
City Minneapolis Nashville Salt
Lake City Seattle Peoria

METZ
Master Six

The car of the Year

A New England Product

Honest through and through

\$1695 F. O. B. factory FULLY
EQUIPPED

We are now extending our agency list
Information at request

METZ SALES CORPORATION
BOSTON, MASS.

(When Writing to Advertisers, Please Mention the Automobile Journal.)

Polarine



It's Easy to Start a Polarined Motor

Polarine Oil does not clog bearings, and is friction insurance, too. Keeps a protecting oil cushion between moving parts and in snug-fitting bearings—absorbs the hammer blows of the piston strokes without severe vibration and knocks, and prevents metal-to-metal friction.

It also maintains a fuel and gas-tight seal between piston rings and cylinder walls that guarantees maximum power with fuel economy the year round.

Buy *Polarine* Oil for your engine and *Polarine* Gear Oil for your transmission and differential gears where you buy uniform, power-full *Socony* Motor Gasoline—where you see the red, white and blue Socony Sign.



Standard Oil Co. of New York

Principal Offices

New York
Albany

Buffalo
Boston

The sign of a reliable dealer and the world's best Gasoline

PAINTING AN AUTOMOBILE.

(W. B. S., Elbowoods, N. D.)

I have two cars to paint and have removed all the old finish. I want to refinish them with what I can apply easily and will not peel. Last year I painted a car with a composition of approximately 96 per cent. oil, but this peeled quickly. I am informed that all oil paint for a first coat is not practical. I believe it should be mixed with turpentine.

Opinions of painters differ with reference to stock, some believing that what is known as a metal filler is best for a first coat, the colors being applied on this. Shellac is occasionally used as a base where there is reason to believe the paint will not adhere well.

Paint manufacturers do not prepare paints with the chance they will give poor satisfaction. Many of them have laboratories where experiments are made carefully and are prepared to advise customers with reference to specific work.

Many automobiles are finished with enamel into which the parts are dipped and afterwards dried at high temperatures. Such finish is hard and will eventually crack and flake. It has the advantage of a high initial finish. Oil mixed paint will never have the same quality of finish, but it will have elasticity and will not crack or flake off.

Some painters mix oil paint and varnish and then thin it with gasoline. Gasoline will dry with a fine gloss, but paint mixed with any other drier will be dull and will not have the appearance of gasoline mixed paint.

For high grade work the best suggestion is to obtain the advice of a well known paint manufacturer's laboratory. This will be a certain guide for you.

CARBURETOR FOR THE FORD ENGINE.

(O. S., Springville, N. Y.)

Which carburetor is the best for a Ford engine, a Rayfield or a Mayer? I cannot afford to experiment with carburetors, but if you know of a better carburetor for the Ford engine than the carburetor originally installed, please advise me.

The Ford Motor Co. supplies a carburetor it knows is suitable for use in all conditions a Ford car can be used practically. Two makes have been supplied, either of which has given good satisfaction. Possibly other carburetors may be better, but such superiority, if it exists, can only be proven by trying differing carburetors on your car and, obviously, the work with each for a definite period. If such test shows any superiority keep the carburetor you approve as permanent equipment. Most jobbers and dealers will allow 10 days trial of a carburetor and this is usually a sufficient length of time to determine the qualities of any instrument.

CARBURETOR TROUBLE ON TWIN SIX.

(R. L., Overbrook, Pa.)

I take the pleasure to ask for a little information in regard to carburetor trouble.

I have a Packard 1-25 Twin Six and this car has a habit of stalling in slow speed, especially in slowly moving traffic. I have tried all the adjustments on the hand wheel and have also tried adjusting the spring on the air valve, but with no success at all. The carburetor has been thoroughly cleaned and I have taken this car to a Packard shop.

The carburetor trouble you experience may be due to the fuel level being either too high or too low. Suggest that you have your carburetor thoroughly adjusted and tested while going over the road, as this is the only practical way of getting a satisfactory adjustment.

Conditions differ in traffic and when moving very slowly through traffic the sudden application of brakes tend to make the fuel surge up at the jet in front of the carburetor chamber, thus giving probably too rich a mixture to accelerate quickly upon pushing down the accelerator.

The operating condition of the carburetor when the engine is running slowly is affected by the varying surfaces of the roadway, which fact makes its operation less certain than when the engine is idling at a corresponding speed when the car is not in motion. Evidently you attempt to run too slowly without shifting into low speed.

(When Writing to Advertisers, Please Mention the Automobile Journal.)

Beware of Imitations. Money Back Guarantee. Positively Non-Injurious. Helps Remove Carbon. Gives Your Car More Power. Makes Car Start Easier in Cold Weather.

CUT DOWN YOUR GASOLINE BILL 30%

GASTINE



"GASTINE" is GUARANTEED to give you 30% more mileage, preventing formation of carbon and assuring easier hill climbing ability, faster ignition and greater power.

A Gas Saver—Carbon Destroyer—Power Producer

Keeps spark plugs clean. Absolutely harmless. Sold in concentrated form—easily dissolved in gasoline. 100 tablets in a box.

Used successfully throughout the civilized world.

"GASTINE" is endorsed by the National Ford Owners Club, Inc., N. Y., U. S. A., Certificate No. 578. Tested and endorsed by Research Vehicle, P. D., and Lehigh University.

SOLD WITH A MONEY BACK GUARANTEE

MORE "PEP" IN YOUR MOTOR



TRADE MARK
REG. U.S. PAT. OFF.

THE GASTINE COMPANY, BRIDGETON N. J. U.S.A.

"Jobbers, Dealers and Consumers are all cordially invited to visit our booth at the New York Auto Show, Space D 211, also our exhibits at Philadelphia and Boston Shows."

Canadian Distributor

ROBERTSON & MURPHY,
423 Coristine Bldg., Montreal, Can.
MONROE TIRE & SUPPLY CO.,
240 E. 54th St., New York City.
THE GASTINE SALES AGENCY,
253 Central Ave., Albany, N. Y.
ARTHUR G. NASON SALES CO.,
416 Montgomery St.,
San Francisco, Cal.
WARE BROS., Spokane, Wash.

Export Dept., 17 Battery Place, New York City, N. Y.

Southern New Jersey Distributors.

TAYLOR BROS., Camden, N. J.

S. F. HOLDEN, 959 Madison Ave.,

Paterson, N. J.

AMERICAN MOTOR CLUB,
(Six Stores) Philadelphia, Pa.

KEIM SUPPLY CO.,

1227 Market St., Philadelphia, Pa.

L. D. HODGES, 33 James St., Bristol, Va.

New England Distributor

NEW ENGLAND GASTINE SALES CO.,
210 Harvard Ave., Allston, Mass.
COWARD AUTO SUPPLY CO.,
222 Eliot St., Boston, Mass.
BRYANT & WARE, 246 Norwell St.,
Dorchester, Mass. Field Manager.
THE STANTON SALES CO.,
185 Middle Road, Portsmouth, N. H.
HOHORST & HAF, Brooklyn, N. Y.
KING HARDWARE CO., Atlanta, Ga.

Dealers write for prices. Some territory still open. If consumers or dealers cannot be supplied from their jobber or dealer, they can order direct from this office. Always give name of their jobber or dealer.

New England Dealers desiring agency for a really fine car at a moderate price, long wheel base, Disteel wheels, magneto, etc., as regular equipment, in 2 pass., 4 pass. and 6 passenger, and closed models, investigate the

"FERRIS-SIX"

Will be shown
at
HOTEL ASTOR
During N. Y. Show

COTTON MOTOR CO.
Eastern Distributor
922 Commonwealth Av.
Boston, Mass.

Less than 1 minute!



YOU now can do in less than 1 minute what you ordinarily take an hour to do. One movement of the lever of the LAWCO Rim Tool and any make—or size—of split rim is out of the tire. Think what this means to you in changing tires. No matter whether you have your car cared for by others or not, there are emergencies when you must fix tires—and then you'll appreciate having the LAWCO Rim Tool in your tool box.

It folds up like a knife—fits into your tool box. It is simple and durable—will last as long as your car. You'll say that it is the best tool you can carry with your car. One tire emergency—in a storm—will more than pay for the LAWCO Rim Tool.

Ask your dealer, or if he cannot supply you, then write to us, sending his name. Don't go through another bit of tire trouble without this splendid tool.

THE F. H. LAWSON COMPANY
Dept. E Cincinnati, Ohio



LAWCO RIM TOOL



Monthly

20c the Copy

\$2 the Year

A Tractor Journal
devoted to the
tractor industry and trade

Published by

The Automobile Journal Publishing Company

PAWTUCKET, RHODE ISLAND

V. A. NIELSEN CO.
708 Beacon Street Boston, Mass.
**We Do Any
Electrical Auto-Repairs**

*Immediate Return Reliable Work
Absolute Guarantee*

Factory Depot for
Connecticut Ignition
Dealers' Parts List Ready

N. E. Distributors
Stokes Carburetor
Agents Wanted

MAY WE DO YOUR WORK

The Accessory and Garage Journal

\$2 the Year, 20 Cents the Single Copy.

The only American publication devoted exclusively to
the Power Vehicle and Allied Industries and Trades.
A guaranteed circulation of 25,000 copies to trade in-
terests only.

Address all communications to the

TIMES BUILDING**Pawtucket****Rhode Island**

PRINCIPLES OF FOUR AND TWO-CYCLE ENGINES EX- PLAINED.

(A. J., Northport, N. Y.)

No. 1—Describe the principles of operation of a four-cycle engine.

No. 2—Describe the principles of operation of a two-cycle engine.

No. 3—Describe the location and use of wristpin or cross-head pin.

In a four-cycle engine the four strokes of the cycle are the suction, compression, power and exhaust in the order of power production, and a description of each stroke follows:

Suction stroke—During this stroke the piston is moved outward in the cylinder by the turning of the crankshaft, either by momentum of the flywheel or some external force. This movement of the piston evacuates the expansion chamber, reducing the pressure in it below that of the atmosphere, which forces air through the carburetor, where it becomes impregnated with gasoline and becomes inflammable and reaches the cylinder through the open inlet valve.

Compression stroke—The compression, ignition and some combustion of the gas takes place during the first inward stroke of the piston. The elapsed time for carburetion of the liquid gasoline and air and its admission into the cylinder is too brief to secure a perfectly combustible mixture. What passes into the cylinder is air, liquid gasoline and a more or less perfect combination of the two, combustion of which would be slow and incomplete, resulting in a loss of power and waste of fuel. The heat of compression more completely volatilizes the gasoline vapor and forces it into more intimate combination with the air. But a perfect mixture may not result for the air and gasoline vapor may be in layers. Combustion is then slow and uneven. When the mixture of gasoline vapor and air is properly proportioned it is ignited during the compression stroke and combustion is well advanced at top dead center in ideal conditions.

Power stroke—Expansion due to the heat of combustion exerts pressure in the cylinder on the piston head, forcing the piston downward, giving to the crankshaft a power impulse and turning the crankshaft.

Exhaust stroke—When the exhaust valve is opened before the end of the power stroke, the greater part of the burned gases escapes and pressure is reduced nearly to atmospheric. The inward movement of the piston forces the remaining gases out of the open exhaust valve. The space between the cylinder head and the piston head when the piston is at the top of its stroke, is the combustion chamber, and this will be filled with unexpelled burned gases, which will dilute the incoming fresh charge.

Two-Cycle Engines.

The two-cycle engine differs from the four-cycle type in that the six events composing the cycle take place during two strokes of the piston or one revolution of the crankshaft. Power is developed during every outward stroke of the piston instead of alternate outward strokes.

That this result may be attained the crankcase is utilized as a receiver for the mixture before it passes to the combustion chamber. The valves are replaced with ports cast in the cylinder walls for the admission of fuel gas and the expulsion of burned gas.

The operation is as follows: As the engine is turned the piston moves upward in the cylinder, reducing the pressure in the crankcase, which reduction causes the gasoline vapor and air to be sucked in through the crankcase inlet port or check valve. When the piston moves down a pressure is created in the crankcase from five to nine pounds, which forces the mixture in the crankcase through a by-pass into the cylinder. A baffle plate on top of the piston directs the rushing fresh gas upward and away from the exhaust port. When the piston is moving down the mixture is forced from the crankcase into the cylinder and the check valve of the carburetor is closed. When the piston is moving upwards the reduction of pressure in the crankcase sucks the check valve open, admitting fresh fuel to the crankcase.

When a mixing valve is used instead of a carburetor the check valve is a part of the mixing valve, but when a carburetor is used there must be a check valve between the carburetor and engine inlet port. The three port type of engine does not require a check valve, as the intake ports are opened and closed by the movement of the piston.

(When Writing to Advertisers, Please Mention the Automobile Journal.)

The National Auto Shows

Under Auspices of National Automobile Chamber of Commerce, Inc.

January 3 - 10

at NEW YORK

Passenger Cars—Grand Central Palace

Motor Trucks and Highways Transport Conferences—8th Coast Artillery Armory

194th Street and Jerome Avenue

Take 6th or 9th Avenue L, or Lexington Ave Subway directly to Armory.

January 24 - 31

at CHICAGO

Passenger Cars—Coliseum and Armory

Motor Trucks and Highways Transport Conferences—International Amphitheatre

Stock Yards

Take South Side L. and change at Indiana Avenue for Halstead Street Station.

S. A. Miles, Manager,

7 East 42nd Street, New York

No. 3—A wristpin is the pivot on which the upper end of the connecting rod swings. It is sometimes solid steel, but usually is a hollow steel tube that is case hardened. It is termed a "wristpin," or "piston pin," but never a cross head pin. It is non-adjustable and when worn the bushings or the piston pin itself must be renewed. In some forms of pistons the pin is a tight fit in the bosses and quite as often is held in place with set screws and lock nuts and cotter pins. Another method of retention is the use of a spring pressed plunger in the inside of the boss inside of the piston. To remove the wristpin in this instance, a small wire forces the plunger up and the pin may be driven out. With this type the bronze bushing is in the end of the connecting rod, which oscillates on the piston pin.

SLIDING GEARSETS FOR FORD CHASSIS.

(M. P., Hamiel, Minn.)

Kindly give me addresses of two or three manufacturers of Ford sliding gearsets. Have seen them advertised in the Automobile Journal, but have mislaid the numbers.

Sliding gearsets for Ford cars and trucks are manufactured and sold by the following companies, either of which will gladly forward you catalogues:

E. D. & A. F. Cronk, Utica, N. Y.

Woodward & Rowe, 2125 Michigan avenue, Chicago, Ill.

American Gear & Transmission Co., 1146 S. Los Angeles street, Los Angeles, Cal.

Tractor-Train Co., 1346 Wall street, Los Angeles, Cal.

Broadway Tool & Machine Co., 717 Livingston street, Elizabeth, N. J.

COMPARISON OF CARBURETORS.

(O. S., Springville, N. Y.)

Which carburetor is the better for a Ford engine, a Rayfield or a Mayer? I am able financially to experiment with such expensive parts. If there is a better carburetor for Ford

(When Writing to Advertisers, Please Mention the Automobile Journal.)

car than the one supplied by the Ford company I would like to know of it.

No comparisons of qualities of automotive products are made in the columns of the Journal. You can obtain at nearly all carburetor agencies the proper size for a Ford car. Put on a carburetor, have it adjusted and give it a trial. Have an understanding with the agencies that if not satisfied by the trial you may return the instrument and get your money back. Carburetors are usually sold under a guarantee that allows this privilege.

CLEANING OILING SYSTEM.

(B. H. S., So. China, Me.)

Kindly give me information as to cleaning the gasoline and oiling system of the automobile. How often is it advisable to change the oil, etc.?

To keep the gasoline and lubricating systems on an automobile engine clean is a factor that has much to do with efficient and smooth operation.

It is advisable to drain off the oil in the crank case every 500 miles and to replace with the best grade of light oil obtainable. During cold weather oil loses its lubricating qualities faster than in warm weather, due to the fact that when the engine is cold a certain amount of the gasoline mixture on coming into contact with the cold cylinder walls is condensed and trickles down into the crankcase, thus thinning out the oil. Possibly a small quantity of water or sediment collects in the bottom of the crank case. This may be removed by unscrewing the drain plug in the bottom of the crank case. When it is necessary to drain the crank case completely, as for changing the oil, it is advisable to thoroughly rinse the crank case with kerosene to clean it.

Remove the drain plug at the bottom of the gas tank about every 500 miles to remove any water or sediment that has precipitated to the bottom, as if this is not done, sooner or later it will be drawn into the gasoline line and find its way to the carburetor, thereby causing complications later.



The Hotel Wellington

7th Avenue at 55th Street
NEW YORK

Located in the center of the Automobile industry, theaters and shopping districts, conveniently reached from all steamships and railroad terminals. The beautiful Central Park is within three short blocks of the hotel.

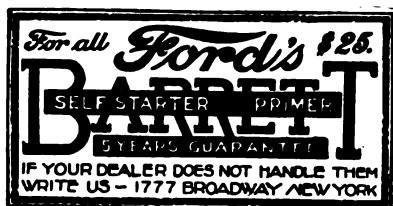
RATES

Room with use of bath, one person.....	\$1.50 & \$2
Room with use of bath, two persons.....	2.50 & 3
Room with bath, one person.....	2.50 & 3
Room with bath, two persons.....	3.50 & 4
Parlor, bedroom and bath, 1 or 2 persons..	5.00 & 6
Parlor, bedroom and bath, three persons..	6.00 & 7
Parlor, 2 bedrooms and bath, 3 or 4 persons	7.00 & 8

Special rates can always be arranged for extended periods on contract, and rates vary with the desirability of the quarters selected, the number of people in the party and the length of stay.

Operated under the Knott Management.

S. M. EATON, Manager.



Giant Searchlight

The highest quality lowest priced lamp produced.

LIST PRICE With Mirror.....\$6.00
Without Mirror...\$5.00

CULVER-STEARN'S MFG. CO.

Worcester, Mass.
Detroit, Mich.

The Automobile Journal

A QUALITY MAGAZINE, WITH PRESTIGE AND CIRCULATION THAT BRINGS RESULTS TO ADVERTISERS

TIMES BUILDING :: PAWTUCKET, R. I.

(When Writing to Advertisers, Please Mention the Automobile Journal.)

TESTING CONDENSER, ETC.

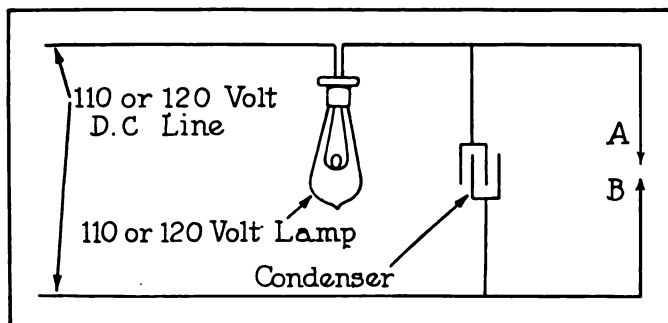
(A. G., New York City.)

1. Kindly publish a drawing of the apparatus necessary for testing a condenser described in an article in the November Journal.

2. Is it possible to time an engine from any other cylinder other than the first, provided you have the firing order right? Does the same rule apply to a magneto?

3. How do you regulate the cut out on an eight-cylinder model 45 Oldsmobile?

1. The test device and circuit is clearly shown in the accompanying cut. For this test a 110 or 220-volt source of direct current is necessary, a lamp of the same normal voltage as the circuit, and the wiring shown. The lamp is connected in series with the line and the condenser across the line. If the terminals "A" and "B" are attached together a very faint spark, which will snap, as when leads from a storage battery are contacted, should occur. If the condenser is disconnected from the circuit a much different arcing will be observed, somewhat longer and more yellow in color, without the distinct snapping sound mentioned. If a condenser, known to be good, is tested in this manner, with this as a guide, the observer may distinguish between the sparks "A" and "B" obtained with a good condenser and a defective condenser very readily, as a poor condenser will cause the same quality of spark as though no condenser were in the circuit. This is merely a qualitative test, but is about the only satisfactory one that does not require expensive apparatus.



2. It is possible to time an engine from any one cylinder, but practise is to use No. 1 because it may be best observed when turning the engine with the crank. No. 1 cylinder is first in the firing order and if that cylinder is timed correctly all others must be timed.

3. Your question as to regulating the cut out on an eight-cylinder Oldsmobile model 45 is rather vague, as the Delco system does not have a cut out to regulate the flow of current from the generator to the storage battery, a third brush on the generator commutator taking its place. This brush may be set ahead in the direction of rotation to increase the charging rate, or moved in the opposite direction to decrease the charging rate. The brush is accessible when the band covering the brushes is removed. Whenever the third brush is moved to a new position it is necessary to fit it to the commutator by drawing a piece of fine sandpaper with the sand side next to the brush between brush and commutator. If this is not done the brush may not fit perfectly and a lower charging rate will be obtained.

The ammeter on the dash should be carefully noted when accelerating the engine after making the change and the maximum charging rate noted.

This generator differs from the ordinary shunt wound type in that the shunt field instead of being connected from one generator brush to the other, couples one generator brush to an auxiliary or third brush, which makes contact on the commutator in a position between the main brushes. The only other unit that might be called a regulator is the circuit breaker, located under the cowl of the dash that opens in case of a short circuit in the lighting circuits. This circuit breaker has no adjustment and in case it does not function it should be removed and sent to the factory.

TROUBLE WITH SAXON SIX.

(H. S. B., Boston, Mass.)

I have a 1917 six-cylinder Saxon. I have taken up all of the engine bearings, but there is a knock when I open the throttle.

By adjusting the bearings you eliminated one cause for a knock, but others worth while investigating are carbon in the combustion chamber and on the heads of the pistons, piston slap, broken rings on the piston, backlash of the timing gears and noisy valve mechanism or sticking valves.

Carbon in the combustion chamber and on the piston head will cause pre-ignition or a distinct knock after the engine has become hot. Piston slap or broken rings on the piston are best located by using a sounding rod, locating the exact position of the noise as close as possible. Backlash of the timing gears can best be restored by fitting new gears, while noisy valve mechanism can be determined by feeling the valve stems and noting the play between the push rods and stems and making adjustment to quiet the valves. This should be done when the engine is warm. If adjusted when cold, as the engine heats, the metal will expand and the valves will hold open, causing irregular operation.

Possibly one of the silencers of the push rod adjustment has worked loose, so that the contact of the valve stem and push rod is metal to metal. Fitting a new fiber silencer will perhaps reduce the noise.

CHAIN NOISE CAUSED BY NEWNESS OF CAR.

(H. M. J., Brookline, Mass.)

I own a new — car which has given good satisfaction, save that a few days ago when I put on tire chains, as I started the car a grinding, seemingly at the clutch, started. The rear axle was vibrating so badly that removal of the chains was necessary. After that the car ran smoothly. What would cause this noise and how can I prevent it?

That your car is new is the explanation. The parts of the rear axle are adjusted closely when new and will have greater clearance after the car has been driven several hundred miles. A car that has been run a short distance only will develop such a noise as you specify as soon as chains are put on the wheels, and vibration will be transmitted through the axles, the propeller shaft and gearset to the clutch. The operator may believe the noise is caused by the clutch.

After the parts have free clearance from wear no noise will be noticeable. Use the chains when necessary. If the car is equipped with non-skid tires on the rear wheels you will be able to do practically all your driving, using chains only when the roads are coated with ice or there is soft snow or mud. Cases have been known where non-skid tread knobs were so large they caused the rear axle to vibrate excessively and when chains were attached over the treads the vibration was greatly increased.

OLD OIL IN ENGINE BASE.

(R. D. J., Allentown, Pa.)

My car is now in winter storage. I did not change the oil in the crankcase when I stored the car. Will I damage the engine if I drive the car about five miles to a garage where I intend to have the car overhauled and the oil drawn off?

You will not damage the engine if the oil is at the normal level in the crankcase. This oil will lubricate as well as a fresh supply for the short distance stated. If you drain the engine crankcase at stated periods you will find your engine will have more power, will have less bearing wear and will be in better mechanical condition. The gasoline obtainable contains considerable kerosene, which is not entirely consumed in the combustion chambers, and works past the pistons and rings into the engine base and oil reservoir, thinning the oil so that it is useless for lubricating. The oil should be drained and fresh oil put in at least every 1500 miles. With better quality gasoline the custom was to drain the reservoir at 2500 mile periods.

(When Writing to Advertisers, Please Mention the Automobile Journal.)

**ONE PACE AHEAD**

THE average Ford passes unnoticed. Equipped with a National Zig Zag Radiator it creates keen interest. Such distinction is a source of much personal satisfaction to every owner.

BESIDES this, however, the more practical kind of satisfaction that comes from owning something which gives results, is yours with National Zig-Zag Radiator equipment.

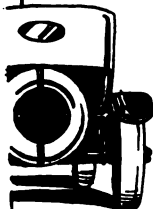
It clearly writes its achievements by actual accomplishments—which speaks louder than mere words. You, too, can benefit by such an installation.

DEALERS.**\$28.00**

We are now in position to offer you an attractive agency proposition. Full information upon request.

F. O. B. Detroit—Finished in either nickel or black enamel. Shipping weight complete 35 lbs.

Let us put you in touch with our nearest dealer.

NATIONAL CAN COMPANY**DETROIT****(Radiator Division)****MICHIGAN****NATIONAL ZIG ZAG RADIATOR****Going and Coming
you need****NON-FLUID OIL**

WHEN your car starts **NON-FLUID OIL** starts lubricating and as long as your car is running, it gives perfect lubrication without melting or wasting away.

Use "**K-00 Special**" for gears

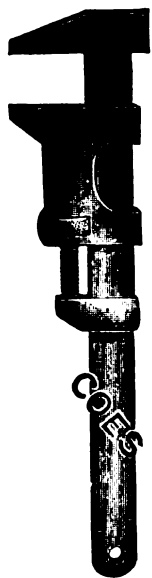
"**K-000**" for all bearings

Ask your Dealer

New York & New Jersey Lubricant Co.

165 BROADWAY, NEW YORK

COES *The Standard WRENCH*



WRENCHES that are made for the hardest service. They do not break but grip and hold and their efficiency never lessens.

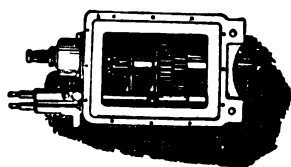
Economy tools as they last longer, give better service and never become useless through wear.

Utility wrenches of the highest order for car owners and repairers as they can be used in compact places and once set hold like a vise.

*The Best Wrench
The Cheapest*

All dealers carry in stock the exact size to meet your need. They recommend Coes Wrenches as all good dealers have for more than fifty years.

COES WRENCH COMPANY
WORCESTER, MASS.



DIXON'S
GRAPHITE
Transmission-Differential
LUBRICANT

The surfaces of the gears in your transmission are like fine sandpaper—so fine that you can't see the rough spots without a microscope—but formidable enough to be a serious menace to the life of the whole transmission unless properly guarded against.

And that is the chief duty of Dixon's Graphite Transmission and Differential Lubricant.

The graphite in this lubricant "fills in" between the high spots—and stays there—making a permanently smooth slippery surface, impossible to obtain in any other way.

Write for Booklet No. 210-G.



Made in Jersey City, N. J. by the
JOSEPH DIXON CRUCIBLE COMPANY
Established 1827



**NEW DEPARTURE
BALL BEARINGS**



*Strength
Stamina
Service*



The New Departure Manufacturing Co., Bristol, Conn.
Conrad Patent Licensees

PURCHASING USED CAR.

(R. J., Milladore, Wis.)

I expect to purchase a used car and would like advice of what parts I should examine critically. Also what guarantee I should expect with a used car? Kindly send me the publisher's addresses of the following magazines: Journal of Nervous and Mental Diseases, Motorcycle and Bicycle Illustrated, Shoe Findings.

The principal parts of a used car to examine are the power plant, running gear or chassis, tires, top, upholstery and paint.

If the engine does not misfire or runs irregularly, is quiet and does not knock, has power on grades, it may be said to be in good operative condition. If the cylinders misfire, or there is carburetor trouble, weak ignition or some other evident defect, the power plant should be overhauled. Wear in bearings, piston slap, carbon in combustion chambers, scored cylinders or cylinders that have been run with poor lubrication are manifested by squeaks and noises audible in the driver's seat. An engine in good condition will have power, pull free in all speeds and climb grades when adjusted.

Note the condition of the clutch when the car is being demonstrated. If the engine will run faster than is necessary for the car speed it is an indication the clutch is slipping and should be renewed or adjusted. Note how the driver shifts the gearset. If they clash when engaging the clutch does not stop and is dragging, or the gears are so burred the teeth do not mesh easily. Either defect can be repaired.

Worn wheel bearings may be located by shaking the wheels either with the foot or hand. The front wheels can be adjusted and the rear wheels tightened on the shaft in case of semi-floating axles, by removing the hub cap, taking out the cotter pin in the castellated nut and tightening the nut. Tires should be examined and the degree of wear taken into consideration.

The guarantee you should expect of a used car cannot be stated as dealers do not guarantee used cars, preferring to sell them as is. Possibly a friend or neighbor might give a guarantee, but usually a car is simply guaranteed to be in running order when delivered and the dealer's responsibility ceases. Some dealers advertise they will agree to keep in repair for a certain period any car they sell, but this is not a contract and would not be binding if an issue arose. The better plan when purchasing a used car if inexperienced is to have a trustworthy friend examine the car and be guided by his judgment.

The journals you inquire about are published as follows:

Journal of Nervous and Mental Diseases, published by Dr. Smith Ely Jelliffe, 64 W. 56th street, New York City.

Motorcycle and Bicycle Illustrated, published by Trade Press Public Corporation, 538 S. Clark street, Chicago, Ill.

Shoe Findings, published by Trade Publishing Co., 189 Madison street, Chicago, Ill.

ADJUSTING OVERLAND 90 BREAKER POINTS.

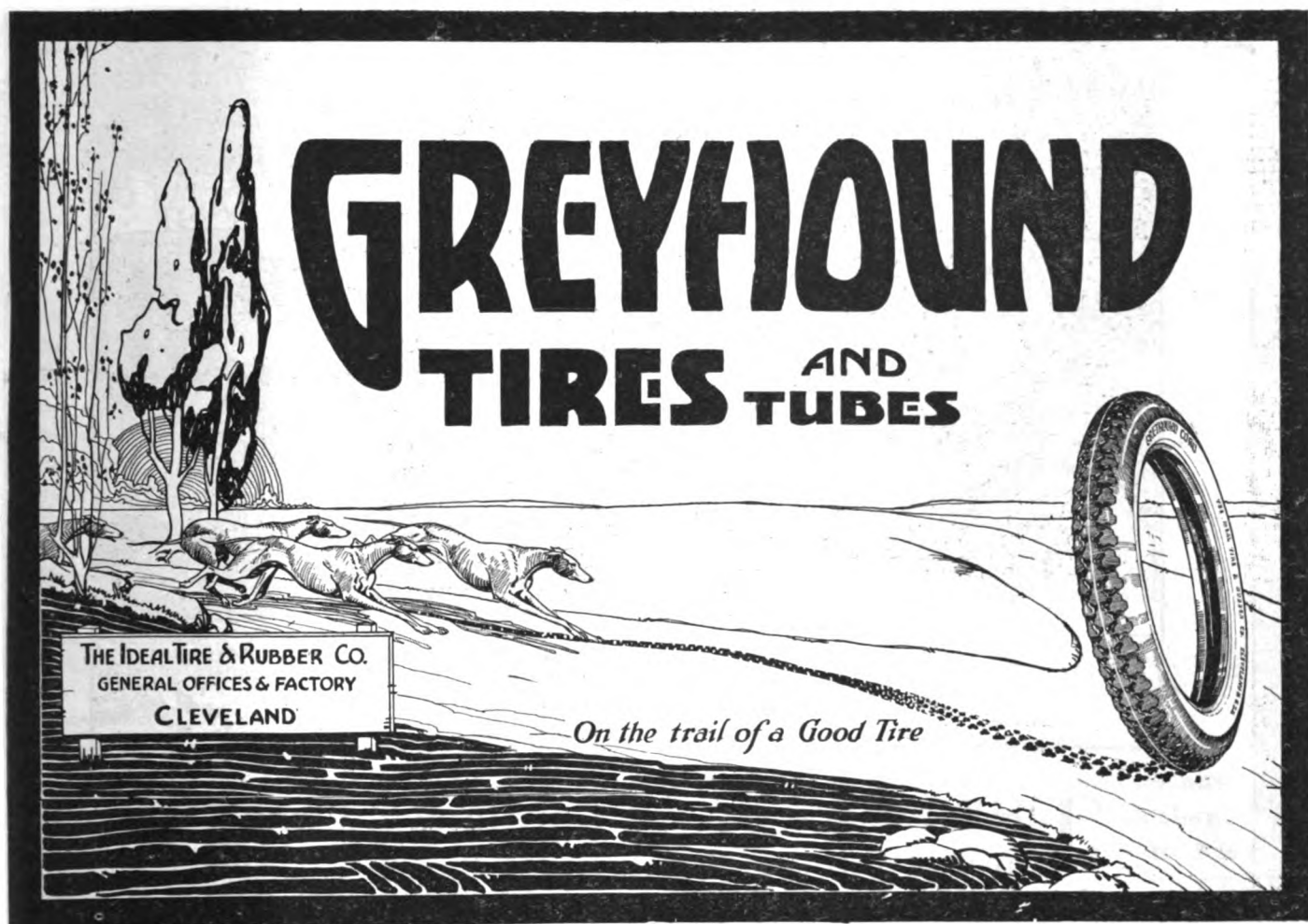
(H. J. S., Kouts, Ind.)

Kindly tell me through the columns of the Automobile Journal whether a quick spark will cause an engine to miss at all speeds? What is the proper adjustment of the breaker points on an Overland 90, 1919 model, and is there any method of adjusting the generator chain without taking off the timing gear case cover?

The timing of the ignition is determined by the speed of the cam in the breaker box revolving at one-half the engine crankshaft speed. The spark occurring at the plug can only have one speed and that, as explained, is governed by the speed of the breaker cam.

The breaker points on an Overland 90, 1919 model should be adjusted 1/32 of an inch apart. Adjustment of the generator chain is made by loosening the two bolts underneath the generator that fasten it to its bed. There are slots in this bed and the chain is tightened by moving the generator bolts forward in the slots till the right adjustment is obtained.

(When Writing to Advertisers, Please Mention the Automobile Journal.)

An illustration for Greyhound Tires and Tubes. It depicts a landscape with a winding road. In the foreground, a large, detailed tire is shown in profile, with the tread pattern visible. To the left, two greyhounds are running along the road. In the background, there are stylized trees and a sign that reads "THE IDEAL TIRE & RUBBER CO. GENERAL OFFICES & FACTORY CLEVELAND". The title "GREYHOUND TIRES AND TUBES" is prominently displayed in large, bold, sans-serif capital letters across the top. Below the title, the phrase "On the trail of a Good Tire" is written in a cursive script.

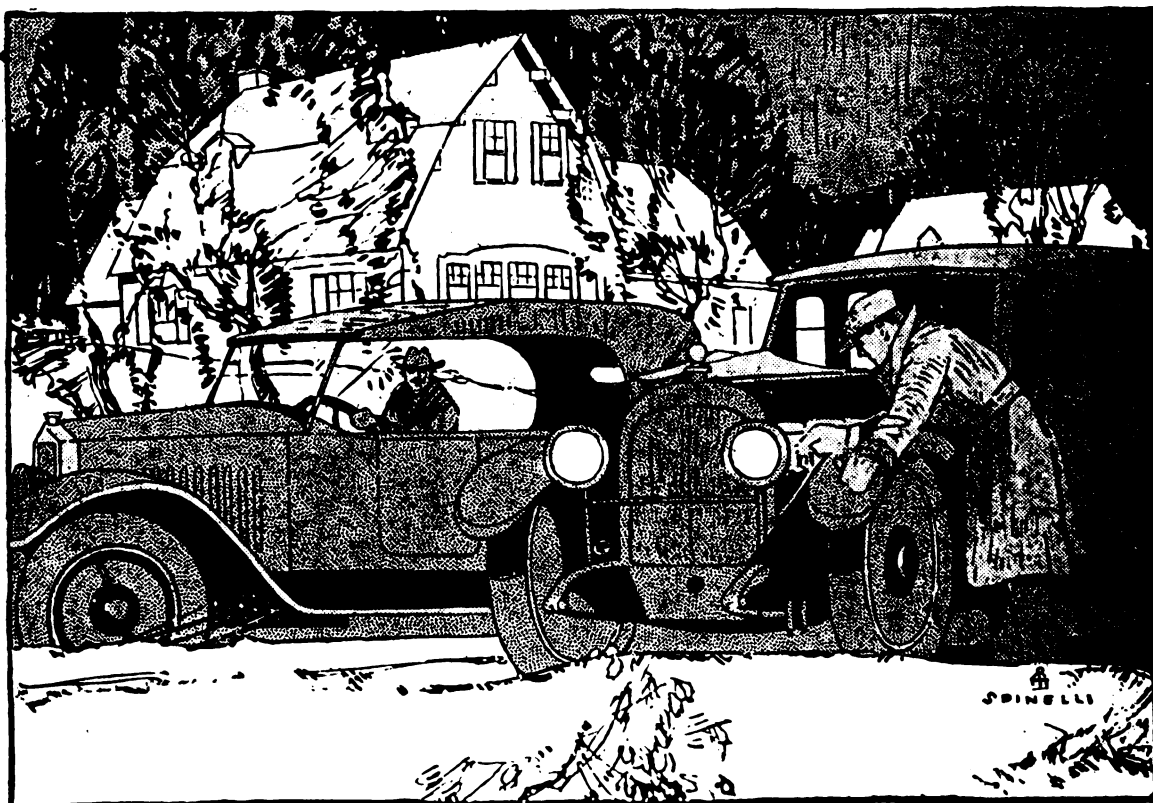
GREYHOUND TIRES AND TUBES

THE IDEAL TIRE & RUBBER CO.
GENERAL OFFICES & FACTORY
CLEVELAND

On the trail of a Good Tire

***Territory Open
For
Live Dealers***

(When Writing to Advertisers, Please Mention the Automobile Journal.)



THERE is satisfaction in knowing why a motor refuses to "turn over" on a cold day. It may be battery trouble superinduced by too much work—pulling against cold, stiff lubricants. It might be other inward troubles of the motor for the same reason.

Most winter troubles may be eliminated by using the proper oil—of proper cold test. We suggest

SUPREME AUTO OIL

as a cure for such troubles

It flows freely at Zero—starts with the engine—gives instant lubrication—relieves the pull on the starter, likewise the battery. It leaves less carbon, hence less pre-ignition—you should use it.

Supplied by any dealer displaying the sign of the Orange Disc.

GULF REFINING COMPANY

General Sales Offices ; Pittsburgh, Pa.

District Sales Offices

New York
Atlanta

Philadelphia
New Orleans

Boston
Houston

AUTOMOBILE JOURNAL

INDEX TO ADVERTISERS

	Page
Atwater Kent Sales Co. of N. E.	6
Barrett Co., The	43
Barrett Motor Starter Manufacturing Co., Inc.	44
Boston Auto Tire Exchange	7
Boston Retread Tire Co.	6
Brightman Auto Exchange	6
Broadway Tire Jobbers Co.	6
Brown Spring Oilier Co.	43
Coes Wrench Co.	48
Connecticut Auto Parts Co., Inc.	6
Cormack Co.	7
Cotton Motor Co.	4
Culver-Stearns Manufacturing Co.	44
Dixon Crucible Co., Joseph	48
Detroit Radiator & Specialty Co.	6
Eagle Oil and Supply Co.	3
Flaherty, Wm. H. Co.	7
Gastine Co.	4
Grant Motor Car Co.	44
Gulf Refining Co.	2
Ideal Tire & Rubber Co.	1
India Tire & Rubber Co.	Cover
Jackson Motor Service Co.	7
Lawson Co., F. H.	4
Liberty Tire Co.	6
Lyons Ignition Co.	8
Madison Tire & Rubber Co.	Cover
Magneto and Generator Exchange of N. E.	7
Magneto Shop	7
Metz Sales Corporation	43
National Automobile Show	45
National Can Co.	47
New Departure Manufacturing Co.	48
New York and New Jersey Lubricant Co.	47
Nielson Co., V. A.	43
Paige-Detroit Motor Car Co.	44
Pierce-Arrow Motor Car Co.	Cover
Standard Oil Co. of N. Y.	42
Strandway Auto Parts Co.	6
Syracuse Rubber Co., Inc.	Cover
Zenith Carburetor Co.	46

TRADE MARK EAGLEINE REGISTERED MOTOR OILS



EAGLEINE OILS

are unequalled for motor lubrication, freer from carbon, economical because they protect the motor against mechanical wear, and the quantity required is comparatively small.

These are the claims of thousands of motorists,—some with years of experience, who want full value; and more who know the value of high grade lubricants, and who know when they obtain satisfaction.

EAGLEINE QUALITY IS INSURED TO YOU

A grade for every type of motor. It is sold in sealed containers.

Let us send you our new book and chart.

It is free at request.

EAGLE OIL AND SUPPLY CO.

44-45-46 India Street, Boston, Mass.

NEW YORK CITY
Woolworth Building

CHICAGO
1132 W. 37th Street

(When Writing to Advertisers, Please Mention the Automobile Journal.)

Beware of Imitations. Money Back Guarantee. Positively Non-Injurious. Helps Remove Carbon. Gives Your Car More Power. Makes Car Start Easier in Cold Weather.

CUT DOWN YOUR GASOLINE BILL 30%

GASTINE



TRADE MARK
REG. U.S. PAT. OFF.

"GASTINE" is GUARANTEED to give you 30% more mileage, preventing formation of carbon and assuring easier hill climbing ability, faster ignition and greater power.
A Gas Saver—Carbon Destroyer—Power Producer
Keeps spark plugs clean. Absolutely harmless. Sold in concentrated form—easily dissolved in gasoline. 100 tablets in a box.
Used successfully throughout the civilized world.
"GASTINE" is endorsed by the National Foot Operating Club Inc., N. Y., U. S. A., Certificate No. 878. Tested and endorsed by Kenneth Weeks, F. D., and Leading Institutions Universally.
SOLD WITH A MONEY BACK GUARANTEE

MORE "PEP" IN YOUR MOTOR



THE GASTINE COMPANY, BRIDGETON N. J. U.S.A.

Jobbers, Dealers and Consumers are all cordially invited to visit our booths and inspect our exhibits at the Philadelphia and Boston Shows.

Canadian Distributor
ROBERTSON & MURPHY,
423 Coristine Bldg., Montreal, Can.
MONROE TIRE & SUPPLY CO.,
240 E. 54th St., New York City.
THE GASTINE SALES AGENCY,
253 Central Ave., Albany, N. Y.
ARTHUR G. NASON SALES CO.,
416 Montgomery St.,
San Francisco, Cal.
WARE BROS., Spokane, Wash.

Export Dept., 17 Battery Place, New York City, N. Y.
Southern New Jersey Distributors.
TAYLOR BROS., Camden, N. J.
S. F. HOLDEN, 959 Madison Ave., Paterson, N. J.
AMERICAN MOTOR CLUB,
(Six Stores) Philadelphia, Pa.
KEIM SUPPLY CO.,
1227 Market St., Philadelphia, Pa.
L. D. HODGES, 33 James St., Bristol, Va.

New England Distributor
NEW ENGLAND GASTINE SALES CO.,
210 Harvard Ave., Allston, Mass.
COWARD AUTO SUPPLY CO.,
222 Elliot St., Boston, Mass.
BRYANT & WARE, 246 Norwell St.,
Dorchester, Mass. Field Manager.
THE STANTON SALES CO.,
185 Middle Road, Portsmouth, N. H.
HOHORST & HAFF, Brooklyn, N. Y.
KING HARDWARE CO., Atlanta, Ga.

Dealers write for prices. Some territory still open. If consumers or dealers cannot be supplied from their jobber or dealer, they can order direct from this office. Always give name of their jobber or dealer.

FERRIS-SIX

A Car of Character

\$3650—Delivered in New England fully equipped including extra tire.

Territory in New England open to Good Dealers.

L. M. COTTON, Distributor
922 Commonwealth Ave.,
BOSTON, MASS.

One push - and the rim is out!

Less than 1 minute to remove any split rim.

Any Size or Style. Carry it in Tool Box.

A Woman or Child can use it! Makes Fun out of Tire Changing!



WHEN you must change tires, you want to do it as quickly as possible. The LAWCO Rim Tool enables you to change any split rim—any size—in less than 1 minute! Think what a convenience that will be to you out on the road. Think what a tool of this sort is worth to you. Yet it costs only

\$3.50—and you can carry it in your tool box. The LAWCO Rim Tool will add much satisfaction to your motoring. Not only in the actual cost of doing the work, but also in the saving of time, trouble and temper, this little tool quickly will pay for itself. It will pay more dividends in satisfaction than any other tool with your car. Ask your dealer, or write us, giving his name. If he cannot supply you.

THE F. H. LAWSON COMPANY
Dept. E Cincinnati, Ohio



LAWCO RIM TOOL

(When Writing to Advertisers, Please Mention the Automobile Journal.)



BOSTON SHOW NUMBER



Automobile Journal

**Devoted to a forecast of the Boston Exhibition
to be held March 13-20**

Will be the most comprehensive presentation of the possibilities of New England sales ever compiled.

It will be unequalled as a medium for all show exhibitors,

As a guide for all show visitors,

And it will reach all readers prior to the show in ample time for all advertisers to receive the largest possible benefit.

This edition will largely exceed the regular distribution.

It will have special value as a buyers' reference.

Edition will be mailed Feb. 22.

Write or wire for reservation of space, and instruct your agency or advertising manager to prepare copy.

**Automobile Journal Publishing Co.
Times Building, Pawtucket, R. I.**

(When Writing to Advertisers, Please Mention the Automobile Journal.)

TRADE OUTLET

TIRES

JOB LOTS

Obsolete, Surplus Stocks and
Factory Seconds

WRITE—CALL

BROADWAY TIRE JOBBERS

250 West 54th Street

New York

Atwater-Kent Sales Co., of New England

663 BOYLSTON ST., BOSTON, MASS.

Official
SALES AND SERVICE
For New England.

Complete stock of parts always
on hand.

Write for Price List.

Auto Mailing Lists

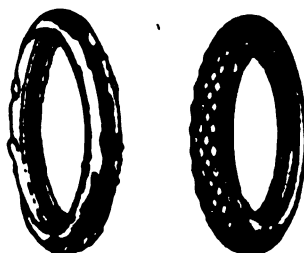
Send for our free complete Price List
covering Auto Dealers, Owners, Ford
Dealers, Truck Dealers and Owners,
Garages, Auto Mfrs. and etc., any state.
A. F. WILLIAMS, Mgr. of List Dept.
166 W. Adams St., Chicago. Franklin 1183.

AUTO PARTS—At Your Own Prices.
We can supply parts for nearly every
make of car. 648 Packards, Interstate
Fours, also Truck parts, GMC and
other makes.

Write us for Parts. We have them.

STRANDWAY AUTO PARTS CO.,
193-195 H. St., South Boston, Mass.

BOSTON RETREAD TIRE CO.



Before

After

OUR METHOD OF RETREADING IS
DIFFERENT FROM OTHERS.

We use all Goodyear first quality stock
and retread bands and can absolutely
guarantee from

3000 to 3500 Miles.

We will replace a new tire for every
one that our work does not give satis-
faction.

Tires called for and delivered. We pay
express charges one way on all out-of-
town orders.

Price List Mailed Upon Request.

BOSTON RETREAD TIRE CO.

70 Clarendon St., Boston, Mass.

SPEED OR POWER FOR THE FORD.
Install a set of:

- 2 1/2 —1 Gears in the Racy Type
- 3 —1 Gears in the Roadster
- 4 —1 Gears in the Delivery

Our Trade Mark—A star on every gear
insures quality.

DETROIT RADIATOR & SPECIALTY
CO., 968 Woodward Ave., Detroit, Mich.

TIRES AND TUBES

Demonstrating and Factory Repaired.
Economy, Qual-
ity, Price. All
Standard
Makes.

Size	Tires	Tubes	Size	Tires	Tubes
30x3	\$5.00	\$1.35	36x4	\$9.00	\$1.75
30x3 1/2	6.00	1.45	34x4 1/4	9.25	1.75
32x3 1/2	6.50	1.50	35x4 1/4	9.50	1.00
31x4	7.25	1.65	36x4 1/4	9.75	1.65
32x4	8.00	1.60	35x5	10.50	2.00
33x4	8.75	1.70	37x5	11.00	2.20
34x4	8.75	1.70			



No Junk. Satis-
faction Guar-
anteed.
Write for Prices on Odd Sized Tires. TERMS:
\$1.00 deposit with each tire ordered, balance C.
O. D. subject to inspection. Specify style of
rim to avoid delay. Although used tires are not
guaranteed for any definite number of miles,
we guarantee our tires to give the best
service in proportion to the prices paid, or rea-
sonable adjustments are made.
LIBERTY TIRE CO., 2119 So. Michigan
Ave., Dept. I, Chicago, Ill.

AUTO PARTS.

50% to 90% Off List.

24 Hour Service. Unlimited Stock.
Pope-Hartford, Columbia, Reo,
Overland and 200 other makes.

Motors, \$20.00 up E. Presto Tanks, \$4.00
Magneto, \$3.50 up B. Presto Tanks, \$4.75
Cylinders, \$3.00 up Bearings, 50c up
Springs, \$1.00 up Rims, \$1.00 up
1000 Other PARTS Bargains.

If you want any part not listed here.
Write Us—We Have It.

Conn. Auto Parts Co., Inc.

18-20 Morgan St., Hartford, Conn.

AUTO SAVE 50-90% FOR 400 CARS PARTS

POPE, PACKARDS, PIERCE, BUICK,
STEVENS-DURYEA, KNOX, OVER-
LAND, ETC.

Motors,	\$25.00 up	Presto Tanks,	\$4.50 up
Magnetos,	4.00 up	New Spotlights,	2.00 up
Carburetors,	3.00 up	Generators,	10.00 up
Rear Axles,	15.00 up	Gears,	1.00 up
Front Axles,	5.00 up	Bearings,	1.00 up
Cylinders,	5.00 up	Radiators,	10.00 up

\$12 Diamond Bumpers.....\$5.50

Jobbers in Bankrupt Auto Supplies.

BRIGHTMAN AUTO EXCHANGE

321 Windsor Ave., Hartford, Conn.

SALESMEN AND DEALERS—A million
Ford owners are waiting for you to
show them the only safety steering at-
tachment; takes that jerk out of the
Ford steering wheel and makes it steer
like a Packard; pays for itself in tire
saving; put it on your car and dozens
want it; if you have small capital and
can put canvassers out to sell the own-
ers, selling yourself to the trade, you
can make a small fortune. Write to-
day. Saxton Auto Accessory Co., Inc.,
347 Fifth Ave., New York City.

—CLASSIFIED ADVERTISING PAYS—

Advertise the bargains that you have
to offer.

8000 Buyers Read MOTOR TRUCK.

(When Writing to Advertisers, Please Mention the Automobile Journal.)

TRADE OUTLET

At 304

Columbus Ave.
For K-E-E-P-S

304

Selling Slightly Used Tires. The Largest Stock in the East. "Your Money's Worth or We Make Good." Remember Our Prices Will Interest You.

Size	Tires	Size	Tires
30x3	\$4.50 down to \$2.40	33x4½	\$12.00 down to \$6.00
30x3½	6.50 down to 3.40	33x5	14.50 down to 8.00
32x3½	8.75 down to 3.90	35x4	10.50 down to 9.00
31x4	8.00 down to 4.00	34x4½	10.00 down to 6.00
32x4	8.25 down to 5.00	35x4½	12.00 down to 6.50
33x4	9.00 down to 5.50	36x4½	12.00 down to 6.00
34x4	10.75 down to 6.00	35x5	25.00 down to 6.90
32x4½	12.00 down to 7.00	36x5	12.00 down to 8.00
		37x5	14.00 down to 6.00

USED TUBES, ALL SIZES, AT \$1.50 TO \$2

MAIL ORDERS given prompt attention. Tires sent C. O. D. with privilege of examination. 5% discount if cash or money order comes with order.

BOSTON AUTO TIRE EXCHANGE
304 COLUMBUS AVE. TEL. B. B. 7329

Magneto Repairs

Skillfully Done. Assured Satisfaction. Prompt Service.

The repair work turned out of this shop is of the highest merit—because I know how. If you have electrical and magneto troubles, no matter whether it is a

BOSCH, SPLITDORF-EISEMANN, or any other make, I can fix them. My well-appointed plant, coupled with skilled workmen, assures you of expert magneto service. Send in your magneto. 24-hour shipment.

Rebuilt Magnetos, Platinum Parts, Generator Brushes, Bearings, Etc.

Correspondence Invited.

The Magneto Shop

JOHN BRUNSWICK,

187 Massachusetts Ave., Boston, Mass.

Magneto and Generator Exchange of N. E.

44 COLUMBUS AVENUE, BOSTON, MASS.

SAVE 50%

Offers

Quality Service for your car.

Starting, Lighting, Ignition.

One year guarantee on repairs and installations of all makes.

Everything pertaining to Auto, Electricity, Magneto and Generator Parts. We have one of the best equipped shops in New England devoted exclusively to this work.

BOSCH, SPLITDORF, EISEMANN, DIXIE, BERLING MAGNETOS
and Parts Always in Stock.



Every Ford owner should read "Transforming the Ford." Tells how to secure smooth, positive brake action that no car can excel. A little "transforming" and your car will glide to a quick, quiet stop without the annoying, irritating clatter that you now experience. It will go into low or reverse without jumping or jerking, and you can pick up speed with all the smoothness and ease of a high-priced car. All accomplished without additional expense and the result is a clear saving of 75 per cent. in one direction alone. "Transforming the Ford" tells how it's done. Send for your copy this very minute. 10c stamps or coin. **CORMACK CO., Dept. 57, 500 Fifth Ave., New York City.**



BOSTON'S Finest Equipped Auto Electric Repair Service

With a staff of trained electrical men we can offer auto owners expert service, coupled with promptness and personal attention to all electrical repair problems. We also repair any electrical equipment used on a motor car. Official service and parts representative for

AUTO-LITE LIGHTING AND STARTING SYSTEMS.
Complete Stock of
GENUINE PARTS.

All Work and Parts Guaranteed.

William H. Flaherty Co.

74 CUMMINGTON ST., BOSTON, MASS.

Tires Guaranteed 5000 Miles

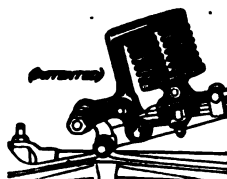
30x3 plain.....	\$8.00
Non-Skid	\$10.00
30x3½ plain.....	\$11.00
Non-Skid	\$13.50

Big saving on other sizes and tubes also. Trade in your old tires. 20% deposit required on C. O. D. orders.

Write for lists to

M. Liben & Co.

793 J 7th Ave., New York City.



Front Absorber why. Write today.
Champion Shock Absorber Sales Co., Inc., Indianapolis, Ind., Mfr.

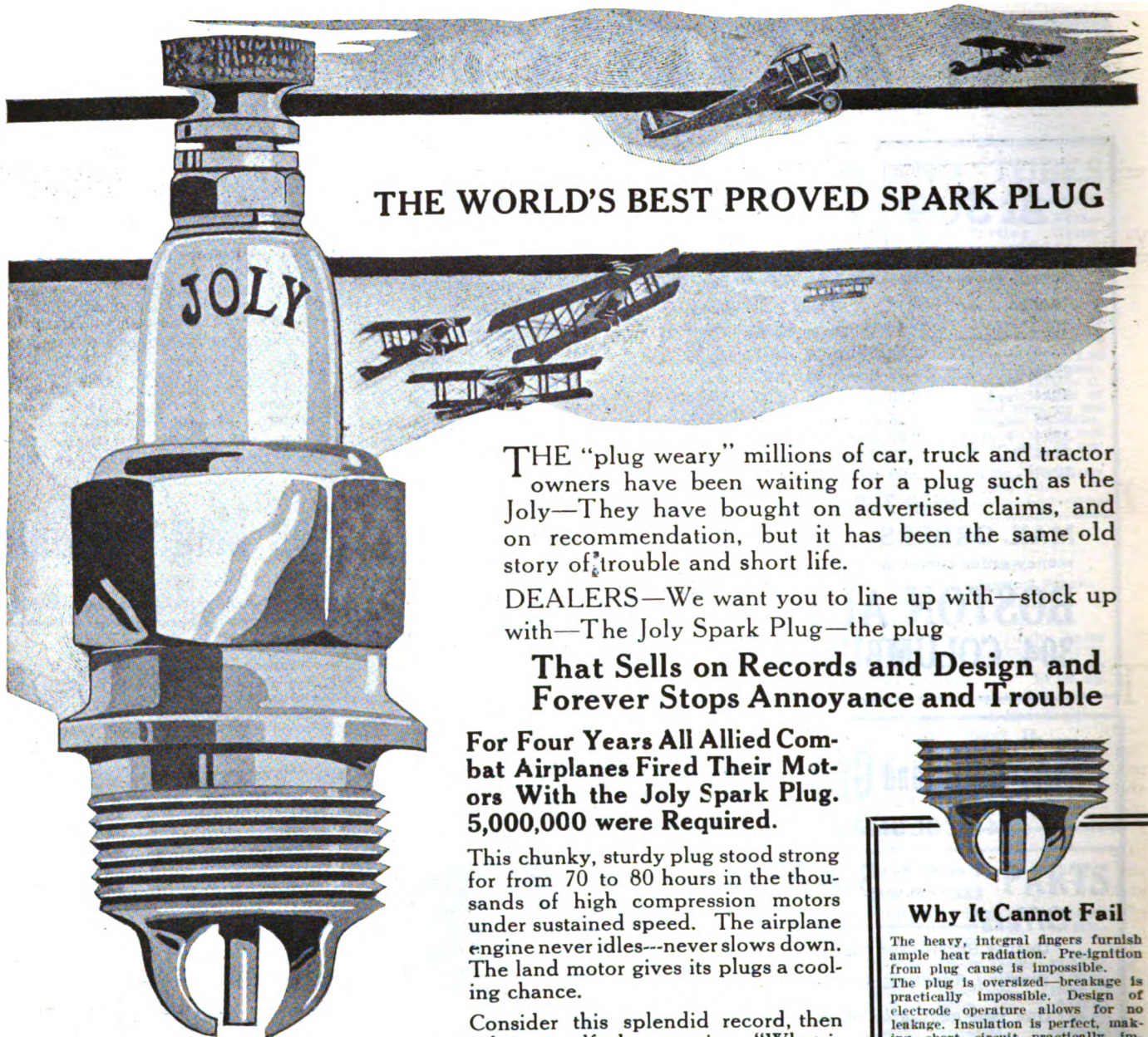
FOR FORD CARS.
"Champion" Shock Absorbers. The perfect spring suspension. Absorbs all jar and rebound. Easy to attach. Fully guaranteed. Makes Ford ride as easy as any \$5000 car. Ford dealers, agents and owners, this ad is worth \$10 to you. Ask why. Write today.

JACKSON PARTS ALL YEARS and MODELS

Prompt and Satisfactory Service
Guaranteed.

Jackson Motor Service Co.
Brighton District, Boston, Mass.

(When Writing to Advertisers, Please Mention the Automobile Journal.)



THE WORLD'S BEST PROVED SPARK PLUG

THE "plug weary" millions of car, truck and tractor owners have been waiting for a plug such as the Joly—They have bought on advertised claims, and on recommendation, but it has been the same old story of trouble and short life.

DEALERS—We want you to line up with—stock up with—The Joly Spark Plug—the plug

That Sells on Records and Design and Forever Stops Annoyance and Trouble

For Four Years All Allied Combat Airplanes Fired Their Motors With the Joly Spark Plug. 5,000,000 were Required.

This chunky, sturdy plug stood strong for from 70 to 80 hours in the thousands of high compression motors under sustained speed. The airplane engine never idles—never slows down. The land motor gives its plugs a cooling chance.

Consider this splendid record, then ask yourself the question: "What is such a Plug worth to my trade—what is it worth in the building of my business?"

There is but one answer: The Joly Spark Plug will outsell any other Plug on its record alone.

LYONS IGNITION CO.

215-19 Fourth Ave.,

New York

Factory, Paterson, N. J.



Why It Cannot Fail

The heavy, integral fingers furnish ample heat radiation. Pre-ignition from plug cause is impossible. The plug is oversized—breakage is practically impossible. Design of electrode operation allows for no leakage. Insulation is perfect, making short circuit practically impossible.

In every way it is rendering the same car, truck and tractor super-service that made it supreme in the air.

IMPORTANT—Do not tie yourself up on any spark plug contract until you have investigated the Joly Spark Plug and the sales plans back of it.

TO THE TRADE—

Aside from selling a plug that knocks the plug grouch out of your trade, we have a discount proposition that you won't pass up—write today.

"JOLY"

(PRONOUNCED "JO - LEE")

SPARK PLUG

(When Writing to Advertisers, Please Mention the Automobile Journal.)

THE AUTOMOBILE JOURNAL

VOL. LXVII.

PAWTUCKET, R. I., JANUARY, 1920.

NO. 6.

Business Was Keynote of Successful New York Automobile Show

Twentieth National Display Featured Practicality and Utility of Motor Car.--Representative Exhibits in All Sections.

THE predominant characteristic of the 1920 automobile show which closed in New York City, Jan. 10, may be tersely expressed in the single word "business." All those in a position to pass accurate judgment, both exhibitors and officials, agreed that never before in the history of these events have so large a proportion of those in attendance been prospective buyers of cars. As a rule in the past the number of merely curious spectators has far exceeded actual buyers, but careful observation this year in-

dicates that these proportions were reversed.

Every year exhibitors have strived to offer at the big show something that would appeal to every class of spectator who might pass their cars in review. There has been a desire to cater to the practical business man as well as the curious woman, either of which might be a potential purchaser. This was pre-eminently the case this year, although the method of appeal differed from the majority of cases heretofore. The display

this year was particularly noticeable on account of the absence of freak designs and flashy finish. It was a practical business show, and necessarily so, for the real desideratum was a sensible and serviceable car, combining comfort and economy, and the majority of models on exhibition presented just these characteristics.

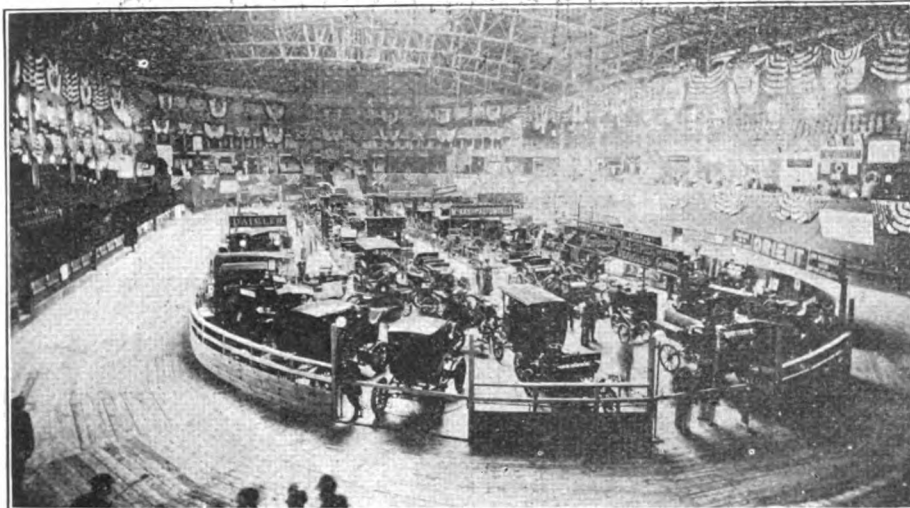
No Marked Changes in Design.

If anyone visited this year's show with the idea that he would see many marked changes in the design and construction



General View Down Main Aisle of Passenger Car Show in Grand Central Palace, Showing the Graceful Effect of the Floral Decorations.

owing the Graceful Effect of the Floral



Glimpse of First Passenger Car Show Held in Madison Square Garden, New York, in 1900, Giving an Idea of Enormous Development of Industry.

of the 1920 offerings, he was doomed to disappointment. The cars looked very much like those of a year ago and it was only by close examination that the little touches of refinement and minor improvements that would necessarily mark a year's progress in the industry could be noted.

The "post-war" car was predicted by some a year or so ago as one which would show revolutionary tendencies in many important characteristics, whereas what appears to have actually developed is a further and more complete standardization of the best of the old designs—a veritable "survival of the fittest." These changes, many of which, as the designers state, are the outcome of valuable experience gained during the war period, although not especially noticeable to the casual observer, are not the less important. The strengthening of various parts and the simplification of mechanical construction are the principal phases. The main design has been left practically the same as for the past two years with a tendency, however, towards straighter lines from hood to tonneau.

In the matter of finish all car builders seem to have treated the matter from a

most conservative standpoint this season as black was the prevailing color for the standard vehicle. The strikingly brilliant hues and startling color combinations of two and three years ago were this year confined almost entirely to special jobs of the sport and racy type. The family car is dark in color, usually black or dark green, and very little trimming of contrasting color is used.

The closed car manifested its rapid development during recent years by easily becoming the leader among the types shown this year. In fact nearly every exhibit that contained more than one model displayed some form of the completely enclosed machine. The sedan was in the majority, but the limousine, landaulet and town car were seen in large numbers.

One of the refinements in the sedan is borrowed from abroad—the glass partition separating the tonneau from the front seats. This division is adjustable and may be dropped out of sight, leaving the standard sedan arrangement.

As the enclosed cars have increased in popularity there has been a change in the style of the upholstery. The leather which is a necessity in open cars to pro-

vide a material that will withstand all kinds of weather conditions, has been replaced in many enclosed models by the softer and more refined plush, corded cloth and other materials more in harmony with the elegance of indoor furnishings.

Heaters as Standard Equipment.

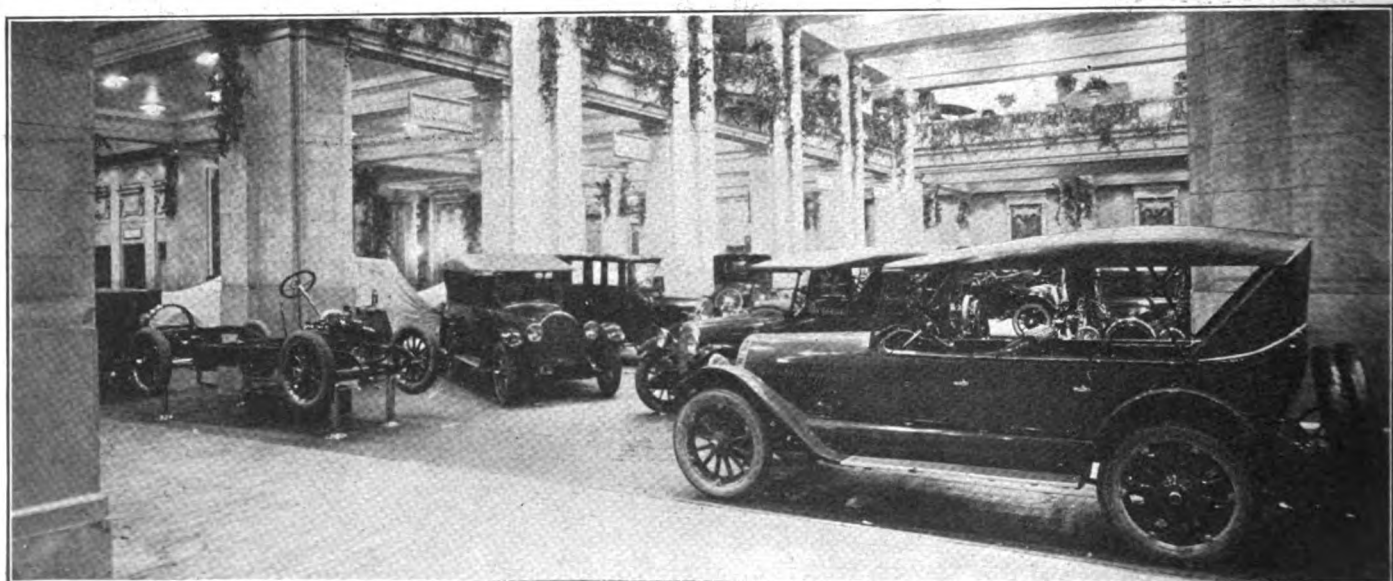
Another development which has logically accompanied the popularity of the completely enclosed car is the introduction of some form of heater as standard equipment, thus perfecting these models for all-year use in any climate. Thirty exhibitors at this show displayed models provided with heaters. This largely exceeds the number of cars so equipped heretofore; in fact, it has hitherto been largely experimental, but the prophecy is now made that some form of heater will soon become standard on all closed cars. It is also significant that this refinement is noted quite as often in the medium priced vehicle as in the more expensive models.

The luxurious equipment of the interior is a noticeable feature. Many of the conveniences and comforts that were formerly included only in the most expensive makes are now added to the standard furnishings of the more moderately priced cars. These included such details as cigar lighters, vanity cases and compartments for cigars and cigarettes, all showing the extent to which designers are catering to the most exacting tastes of a fastidious clientele.

Wire Wheels on the Increase.

While the standard artillery or wood spoke wheels are still in the majority, the wire type was seen on more cars than ever before, and it is obvious that it is gaining in popularity. Disc wheels, which were in vogue last year and 1918 as a war time characteristic, are still found on many of the more luxurious cars.

The requirement in regard to non-glaring headlights now demanded in many states has resulted in the equipment of practically all the new models with some form of lenses that will comply with the regulations. In some cases even the spot-



Transverse View of Exhibition Hall, Grand Central Palace, Showing the Setting in

light has been supplied with a form of lens that is meant to eliminate the glare without impairing the volume of light.

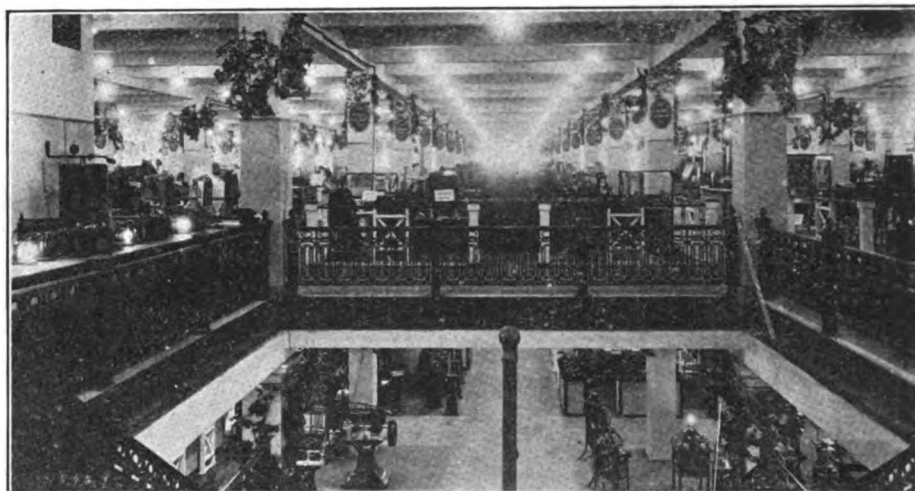
Mechanical Features Predominate.

It is fast becoming the rule that the owner or prospective buyer of a car who is entirely ignorant of the mechanical make-up of the modern motor car is rare exception, and to meet the desire of such to learn everything possible of the internal economy of the automobile, the manufacturer has used various methods of showing the power plants of his models in actual operation. Many engines were mounted on blocks and cut away to show the interior of the cylinders. Some of these were in motion, being operated by electric motors. Small electric lights illuminated the interior so that all operations could be clearly seen. Other engines were mounted so as to be cranked by hand.

In many cases some exclusive feature of the power plant of a particular car was thus graphically demonstrated.

Decorative Features.

In the novelty and effectiveness of the decorative scheme, Manager Miles again manifested his originality and taste at the Grand Central Palace this year. The imposing features of the entrance were accentuated by the simplicity of treatment, and the visitor was prepared by his first glimpse, through a frame of bay trees and floral masses, for the carrying out of the attractive plan in the interior. Garlands of smilax and greens brought the design into harmony with the spirit of the holiday season, and also suggested the approach of spring. Each display was enclosed by a white railing supported by white posts capped with brown. The big windows that light each of the four floors were curtained with especially designed fabrics. But the "piece de resistance" was embodied in the tapestry panels set at regular intervals along the walls, which depicted fanciful scenes of English country life done in the old English manner. They bore coats of arms and at the top were imprinted the names of the adjacent exhibitors.



General View, Accessories Division, Grand Central Palace, by Which May Be Noted the Comprehensive Character of This Section of the Show.

Attendance Was Large.

In point of attendance it is conservatively estimated to have considerably exceeded previous years, notwithstanding the fact that the admission price had been raised to meet post-war conditions. The exhibition halls were well filled at all times and during the rush hours of the afternoon and evening the public was present in veritable throngs.

Considered from its business aspects, it was thoroughly demonstrated that the productive capacity of the motor car industry is still very limited when contrasted with the apparently almost limitless absorptive capabilities of the automobile using market in the United States and abroad.

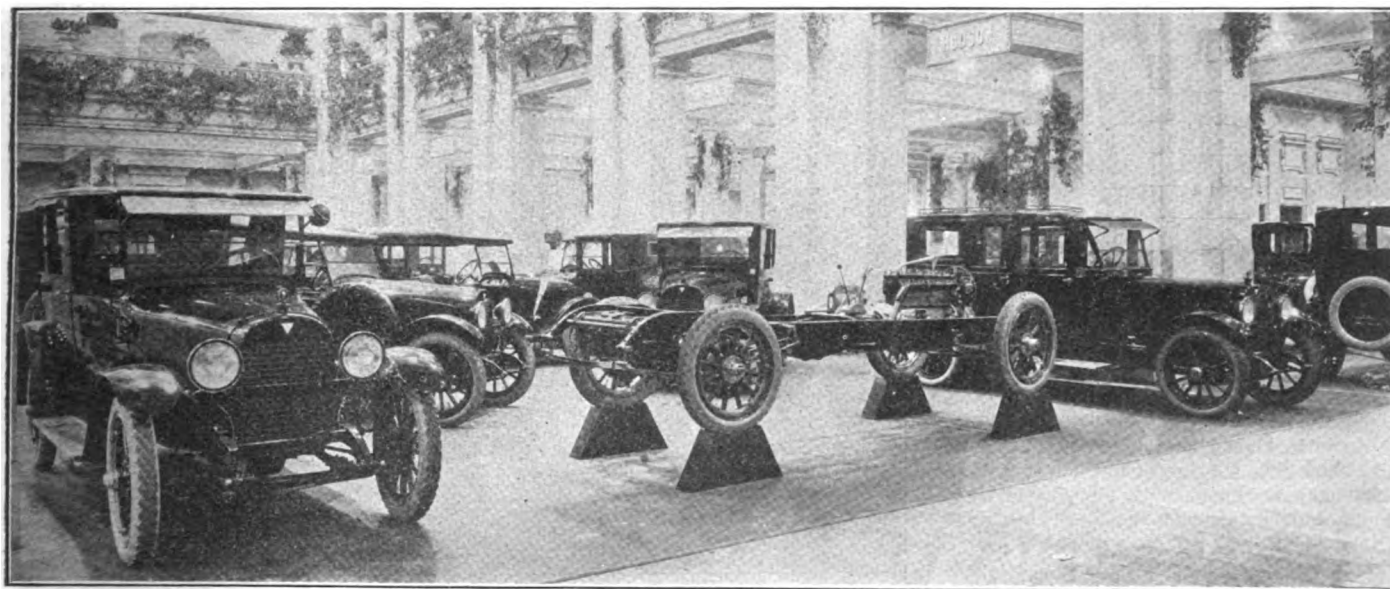
In many instances it appeared that those in attendance came to the exhibition with a clearly defined idea of what would best meet their needs and tastes, and manufacturers' representatives were confronted not so much with questions of comparisons of styles and types as by problems of delivery when the order was once booked. It is stated that on account of the unprecedented demand for cars during the opening part of the season before the show was held, and condi-

tions which have materially reduced production, many exhibitors, with the exception of those prepared to produce on a quantity basis, or a few of the new comers whose products are not yet so well known, were somewhat embarrassed when pressed for promises of immediate delivery.

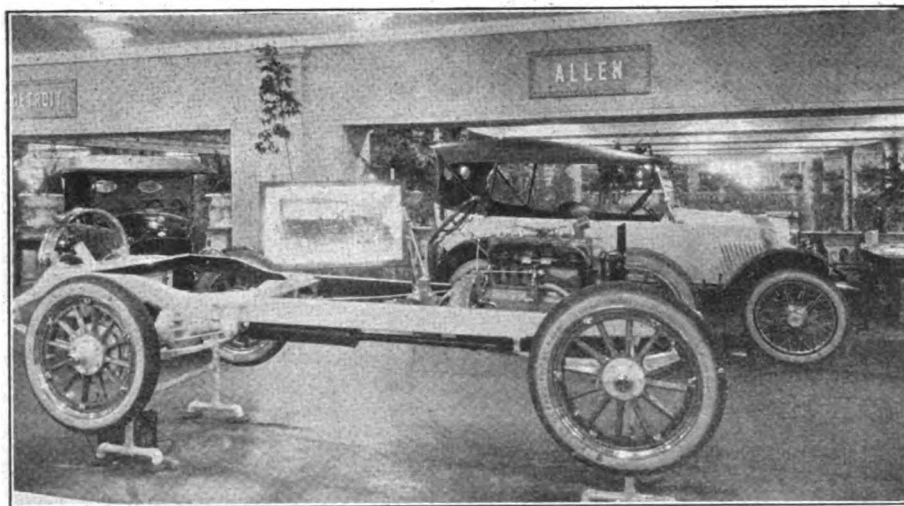
Events During the Week.

Among the social events of show week participated in by organizations affiliated with automotive interests were the following:

On Monday, Jan. 5, the Rubber association dined at the Waldorf hotel. The annual dinner of the National Automobile Chamber of Commerce was given on Tuesday, Jan. 6, at the Hotel Commodore. On Wednesday, Jan. 7, the National Automobile Show Managers' association had a luncheon and meeting at the headquarters of the Automobile Dealers' association, the professional section of the Society of Automobile Engineers dined at 1 o'clock, the 12th annual banquet of the Motor and Accessory association was held at 7:30 o'clock in the grand ball room of Hotel Commodore, and carnival night was observed at 9 o'clock at Hotel Astor by the automotive engineers.



Harmony with Holiday Season and Including a Number of Representative Car Displays.



Showing of Allen Motor Car Co., Columbus, O., Included Latest Model Touring Car and Chassis.

Features of Motor Truck Show

The overwhelming success of the commercial car section of the show was felt by many to be a remote possibility, when considered in the light of the unfavorable location of the Eighth Coast Artillery Armory for housing an exhibition so far distant from the normal downtown show district. There were those, too, who advocated that this class of vehicle should be shown independently of the passenger car section in point of time, while still others maintain that the motor truck and its components are at best doubtful prospects as successful exhibition features.

There is, however, no doubt in all minds that in many respects this show of 1920 was as successful a truck exhibition as could be staged, and this was manifested in many ways. Manufacturers reported that business was transacted in good volume, and it is unquestionably the fact that many of them, if they book no more orders for some time to come, will be fully engaged in filling those already listed for a considerable period.

The foreign demand for the commercial wagon was plentifully in evidence and extremely encouraging.

Exhibits Were Beyond Criticism.

The exhibits were beyond criticism as regarded quantity, quality and effective arrangement, and afforded an epitome of whatever is of utility in this great branch of modern transportation.

As was true in respect to passenger cars, not much in the way of noticeable modifications over previous years was manifested in the machines on view. A development of interest was the advent in considerable numbers of the light truck forms designed and equipped for higher speed than the heavier types.

Increase in Pneumatic Tires.

A noticeable phase of this section of the show was the increase in the number of trucks equipped with pneumatic tires instead of solid, and the desirability of these air filled tires for many types of machines to lessen road shocks was pointed out by many truck and tire manufacturers.

The solid tire is by no means in the discard, however, as a large number of giant cars, equipped with enormous solid rubber shod wheels were in evidence and, of course, the dual form at the rear were common on the heavier vehicles.

Many Parts Were Shown.

Practically every exhibit of a complete truck or tractor was supplemented by a display of parts that came in for its full share of inspection. An unusual number of rear axles was shown with both worm and chain drive. A comprehensive exhibit of engines was also of particular interest to the mechanically inclined.

The collection of statistics that made up an important exhibit showed the cost of transportation by trucks as compared with the horse drawn method. This was studied by many business men who were interested in the truck as a means of solving their delivery and shipping problems.

Transportation Congress.

The sessions of the Transportation Congress will be repeated at the Chicago truck show.

Accessories Attracted Much Attention

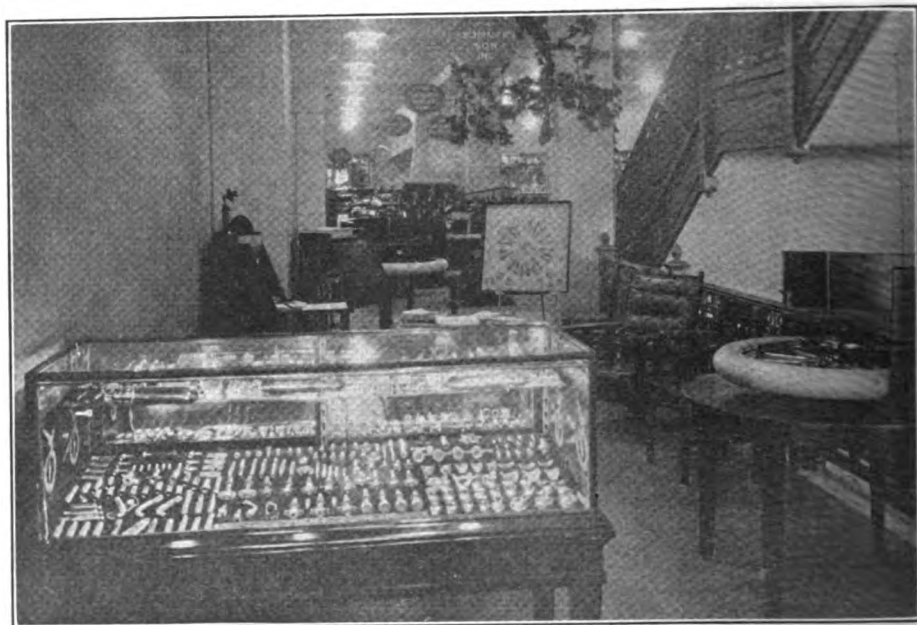
The allotment of space for the accessories division at both the Grand Central Palace and the Armory, made for a more adequate representation and effective arrangement than ever before. The exhibits devoted to passenger cars at the Palace, as was to be expected, outnumbered the truck section at the Armory, but there were 75 exhibitors making displays devoted exclusively to the commercial wagon at the latter place alone. At the Palace the entire fourth floor was devoted to this department.

No section of the show appeared to attract more attention than this part devoted to accessories. Here thousands of the parts that make up the automobile and its components were on view, as well as the components themselves, and the myriad devices that are designed to add to the convenience and comfort of the motorist, the utility and economy of operation of the car, and to facilitate the care and repair of the automobile in repair shop or garage.

These devices were attractive not alone from their novelty and practicality, but also by the striking mechanical methods of demonstration. This section of the show alone might afford many hours of pleasant and profitable study to those specializing in automotive mechanics and the up-to-date knowledge thus disseminated was more comprehensive and of more utility in many respects than could be gained by a long period of actual repair shop experience; while even the casual non-mechanically trained observer could not fail to be attracted and amazed.

The Whirr of Machinery.

This part of the big building hummed with the whirr of machinery and it seemed as if every component or device that had any movable features might be seen in operation during the hours the exhibition was open. The entire range of up-to-date tools, garage appliances and



One of the Representative Accessory Booths Was That of A. Schrader's Son, Inc., Brooklyn, N. Y.

equipment was graphically represented and under continuous demonstration.

One of the most interesting exhibits, in the light of the recent agitation in regard to short measure given at oil filling stations, was a new visible measure shown in connection with an oil supply pump and tank. The appliance is supplied with a 10-gallon glass container marked off into gallons, visible to the purchaser at all times. As a fresh supply of liquid is pumped up through a rubber tube, the amount already in the container is automatically emptied into fuel tank of the buyer's car, so that by noting that the container is filled each time and keeping count of the number of times the container is filled and emptied, the customer can be sure that he is getting the full amount paid for.

Other Displays.

There was also a comprehensive display of head lights, spot lights and patent dimmers, all designed to comply with the present regulation in various sections of the country.

Speedometers of various types were belted to motors, demonstrating their principles of operation and utility. Some devices for the dash board were so complete as to afford an adequate record of whatever the motorist would desire to know concerning rate of travel, trip and total mileage, oil and fuel consumption, tire mileage, condition of electrical equipment, etc.

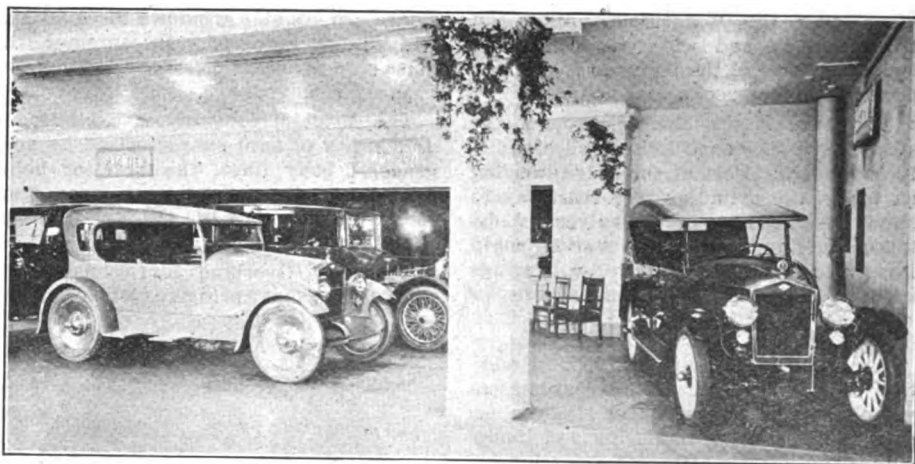
The showing of magnetos, storage batteries and electrical devices was especially complete.

One of the most attractive booths was devoted to robes, auto gloves and especially designed automobile coats, caps and other wearing apparel.

OFFICIALS OF THE SHOW.

This 20th national automobile show was held under the auspices of the National Automobile Chamber of Commerce, which has been so conspicuous in its successful sponsorship of similar events.

The entire executive department has



Up-to-Date Disc and Wire Wheel Equipment Shown on Jackson Cars, Made by Jackson Automobile Co., Jackson, Mich.

been in the hands of Samuel A. Miles, whose enviable record as a manager of these nation wide exhibitions is coincident with the shows themselves and forms a notable chapter in the history of American automotive activities.

The president of the Chamber of Commerce this year is Charles Clifton, one of the best known representatives of the industry, and associated with him are the following committees: Passenger car section—John N. Willys, Willys-Overland Co., Cleveland, O., chairman; H. G. Root, Westcott Motor Car Co., Springfield, O.; Harry M. Jewett, Paige-Detroit Motor Car Co., Detroit. Truck section—Martin L. Pulcher, Federal Motor Truck Co., Detroit, chairman; A. J. Whipple, Diamond T Motor Car Co., Chicago; David Ludlum, Autocar Co., Ardmore, Pa.

CHICAGO SHOW, JAN. 24-31.

The majority of the exhibits will be seen again at Chicago the week of Jan. 24-31, the passenger cars and accessories at the Coliseum and Annex and First Regiment Armory, and the truck section and accessories at the International Amphitheater.

Brief Features of Cars Shown

The Kissel Motor Car Co. made its premier exhibition of the new 1920 custom-built models, consisting of the four-passenger coupe, six-passenger sedan and four-passenger urban sedan.

One of the features of the new Marmon cars is the new instrument board on which all instrument dials are grouped in the center of the board. The group is glass covered and supplied with indirect glareless lighting.

Instead of the battery magneto system the new Pierce-Arrow models are equipped with a special dual ignition system, using two sets of spark plugs, two distributors and two timers, working independently, but in exact unison.

At the Oakland exhibit a new four-door sedan and a smart coupe were the feature cars. The changes include several chassis refinements, while the body is of different design from that of last season.

Four body models and a chassis formed the Dort exhibit. The cars included a five-passenger touring car, roadster, four-season sedan and a three-passenger coupe.

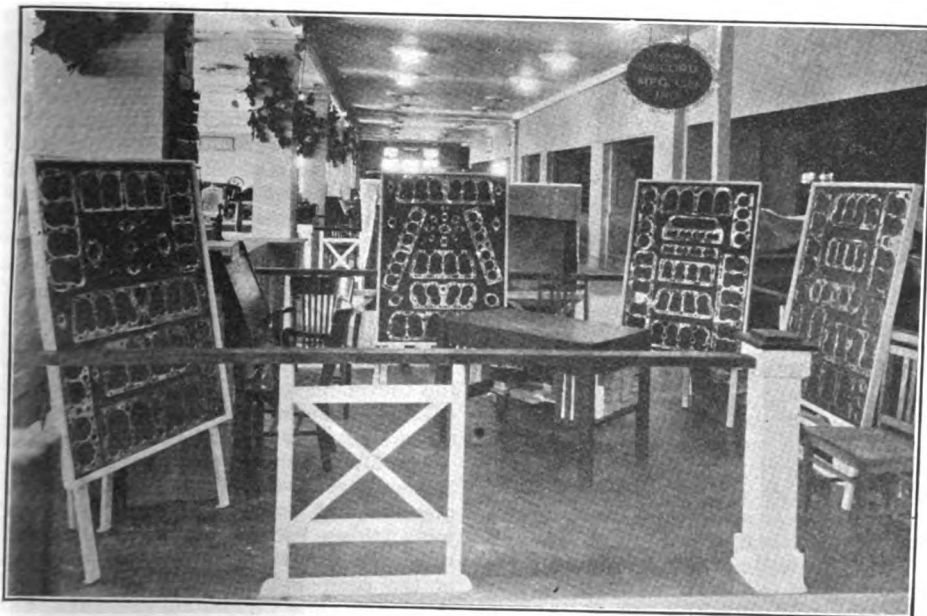
In the Willys-Knight cars there has been a decided departure in body lines, the hood being of pentagonal design. The crowned fenders are in keeping with the general low, racy appearance.

The 1920 Velie appears in a new design. The wheelbase has been lengthened to 122 inches to give long, racy lines, and a high cowl and diminished windshield further reduce the resistance of air currents. A new six-cylinder car is its special feature of the year.

Many principles of aero type construction are embodied in the Cole aero eight cars. The 1920 models include six types—the sportsedan, sportcoupe, sportosine, toursedan, tourosine and towncar.

The new Haynes coupe is a distinctive all-season car, seating comfortably four passengers, and is intended for the business man whose time is limited and for women in their social and shopping activities.

A high, narrow radiator, duplex head lamps of distinctive design, a tapering bonnet of many louveres, a patent leather



Display of McCord Manufacturing Co., Inc., Detroit, Maker of Gaskets, Shims, Metal Stampings, Radiators, Etc.

visor over the windshield, individual front fenders and wide, sharp-cornered doors are some of the features of the new National Sextet sedan and coupe.

The 1920 Essex chassis showed the strength of its construction and simplicity of design. Part of the valve housing on top of the cylinders was cut away to show the operation of the valves. A detail of the fine material and workmanship is seen in the little Hyatt roller bearings used on the intake valve rocker arms.

The Hudson Exhibit.

The Hudson exhibit included, in addition to a stripped chassis, a four-passenger phaeton, seven-passenger phaeton, sedan, coupe, touring limousine and limousine. The chassis attracted attention because of its strength and the simplicity of its lines.

The Franklin Motor Car Co., Syracuse, N. Y., presents five models, all mounted on one type of chassis, the touring car, runabout, four-passenger roadster, sedan and brougham. Open and closed bodies are interchangeable.



John N. Willys, Chairman, Passenger Show Committee.

In addition to its sixes the Nash company showed for the first time this year a four-cylinder model with a flexible valve-in-head motor and an attractive streamline body.

The improvement in Peerless body design is noticeable chiefly in the heightened radiator and in more graceful handling of the lines at the cowl, and improved fender design.

The Maibohm car is making its first appearance in a New York show. It is a light six made in Sandusky, O., by a concern that began the manufacture of wagons 30 years ago.

Numerous improvements characterize the 1920 Case cars. The wheelbase has been lengthened to 126 inches. The Delco ignition system has been installed with the Westinghouse starter and generator. The divided front seats are displaced by a solid front seat.

The Lexington's latest closed car model is known as the Lex-Sedan. It is of the four-door type, with high sides.

There are six side windows of equal size and square cornered. In summer the glass side panels and frame work may be entirely removed.

The Mitchell company is exhibiting a new series of cars characterized by very graceful body lines, the radiator being sloped back smartly to get away from the stubby effect of the old style straight radiator.

The new Overland four sedan, with their three-point spring suspension, make

of the disteel type—nickel plated all over.

Improvements in Dodge Cars.

Dodge Brothers, Detroit, made some improvements on its touring car model which added to its attractiveness. The slanting windshield has been adopted as have door opening curtains and French plaited upholstery. Grease cups have been done away with and the Alemite system of lubrication substituted.

Moon Motor Car Co., St. Louis, brought out two new chassis models. The power plant is now the new Continental 7-R with a four-bearing crankshaft; the wheelbase has been lengthened four inches, making it 122 inches; the frame is deeper, springs are longer, the improved Delco system is used for ignition, gasoline tank is in rear, the Stewart vacuum tank has been adopted and cord tires are standard equipment.

The new Moon roadster model shows in body and design a flowing straightness of lines, the bevel of the streamline being carried from the radiator all the way



Samuel A. Miles, Manager.



H. G. Root, Member, Passenger Show Committee.



Harry M. Jewett, Member, Passenger Show Committee.

through the body with its graceful sloping deck.

The new Silhouette Five series at the exhibit of the Jordan Motor Car Co., Cleveland, attracted a lot of attention on account of their distinctive body designs with five-passenger capacities.

The Pierce-Arrow Motor Car Co., Buffalo, N. Y., showed a new four-passenger sedan body on its smaller 38-horsepower chassis. All bodies are slightly lower than previously.

Two closed bodies have been added to the Cleveland light six line, made by the Cleveland Motor Car Co., Cleveland, O., these being a sedan and coupe.

The Mercer show models, made by the Mercer Motors Co., Trenton, N. J., were distinguished by their high class coach work, there being no hint in the cars themselves of the recent reorganization of the company and the taking over of the Locomobile Co.

In the 1920 Chandlers, manufactured by the Chandler Motor Car Co., Cleve-

an attractive appearance in their body finish of Copenhagen blue.

A new light six features the Studebaker exhibit on a 112-inch wheelbase chassis and weighing less than 2500 pounds for the complete touring car.

The Apperson Brothers Automobile Co., Kokomo, Ind., featured a new eight-cylinder model in which 80 of the parts usually found in the standard automobile have been eliminated. It was beautifully finished, being nickel plated at every possible point. The wheels were

land, the principal mechanical refinements are the combining of the intake and exhaust manifolds for better fuel vaporization and an improved rear axle with an adjusting nut on the outside.

The Winton Co., Cleveland, showed its new lighter six model 25, and the air of refinement was manifested in the entire display.

Changes in the Maxwell.

The Maxwell Motor Co., Detroit, has made two changes in the chassis, one being the adoption of a two-unit electrical system and the other the use of the Eagle carburetor.

Two new features have been incorporated in the Templar Four, made by the Templar Motors Corporation, Cleveland. These are a bronze windshield and radiator and ball bearing steering knuckle. A new touring speedster model was also shown.

All the body types of the Chalmers, built by the Chalmers Motor Car Co., Detroit, are new. The radiator is larger,

passage of fuel. The rear springs are exceptionally long, 61½ inches, the drive being the improved Hotchkiss. The wheelbase is 119 inches.

The Oakland Motor Car Co., Pontiac, Mich., is using a heavier frame with cross members and has lengthened the wheelbase three inches.

The Columbia Motors Co., Detroit, has added three attractive new models to its line—a sedan, coupe and a roadster with steel disc wheels.

Larger parts than previously used are the predominating changes made by the

Wis., exhibited two new closed models, both built in the Mitchell body plant. These models have square lines with the rear corners relieved by a bevel.

Features in the Jackson.

The Jackson Motors Corporation, Jackson, Mich., featured the 6-38 model. This has a Continental six-cylinder engine, L-head type, with removable head. It has 3¼-inch bore by 4½-inch stroke. The crankshaft is of heavy design, accurately counter-balanced with three long bearings. Cams are integral with the shaft. Timing gears are helical of wide face, and cut at an angle that makes them noiseless in operation. Lubrication is a combination of force feed and splash. Water circulation is by a centrifugal pump and the tubular type of radiator is fitted with a Motometer. The carburetor is a Stromberg, one-inch side outlet type, and gasoline is supplied by Stewart-Warner system. The Auto-Lite two-unit starting and lighting system is used; the clutch is Borg & Beck single, dry disc;



Col. Charles Clifton, President of the National Automobile Chamber of Commerce.



A. J. Whipple, Member, Truck Show Committee.



David Ludlum, Member, Truck Show Committee.



Martin L. Pulcher, Chairman, Truck Show Committee.

as is also the hood, the cowl is high and the body sides are cut low. A new four-passenger sport model on wire wheels was shown.

The Crow-Elkhart Motor Co., Elkhart, Ind., showed advanced designs in touring car and sedan models. The lines of the hood and body extend without a break from the radiator to the rear. The running boards are low and the fenders give a graceful sweep to the general lines. The sedan has V-type windshield.

The new Grant light six, shown by the Grant Motor Car Corporation, Cleveland, was equipped with a slightly larger engine, 3 1/16 by 4½ inches.

A few minor changes were seen in the Hupmobile, made by the Hupp Motor Car Corporation, Detroit.

The Paige-Detroit Motor Car Co., Detroit, has brought forward its own new engine for the new model 6-42, which supplants the former Linwood model. This engine is 3½ by five inches, with intake and exhaust manifolds combined and valves at a slight slant to allow freer

Elgin Motor Car Corporation, Argo, Ill., in its 1920 models. This includes the enlargement of the clutch from eight to 10 inches and both axles are now made oversize. The Muncie transmission has been adopted as has a four-brush starter and steel disc wheels for standard equipment.

The Olds Motor Works, Lansing, Mich., has adopted a new transmission on the new Oldsmobile Eight series; for ignition, a dual Delco system is used and the Spicer universal joint has been adopted.

The Mitchell Motors Co., Inc., Racine,

transmission is Covert selective type; rear axle is a Salisbury.

The Peerless Motor Car Co., Cleveland, showed a touring car with a solid front seat, and the feature of this line is its especially complete equipment.

The Premier Motor Car Co., Indianapolis, Ind., includes in its equipment two extra ribbed tread cord tires mounted rakishly astern, two spot lights in addition to duplex head lights, two built-in-cowl lights for use when parked, two reading lights on touring as well as closed cars, also rear door lights, two cigar lighters, Perfection heater in open as well as closed cars, Pyrene fire extinguisher, Gabriel snubbers, Kellogg tire pump, Waltham eight-day timepiece, Boyce Motometer, windshield cleaner, etc., all in addition to the usual list of accessories.

The Comet car, made by the Comet Automobile Co., Decatur, Ill., showed its new model C-53. This uses the Continental Red Seal 9-N, six-cylinder engine, has a wheelbase of 125 inches and is com-

posed of well known units. Its weight is 2950 pounds.

The R. & V. Knight cars, formerly known as the Moline-Knight, made by the Root & Van Der Voort Engineering Co., East Moline, Ill., have been improved by the use of a six-cylinder Knight engine, $3\frac{1}{4}$ by $4\frac{1}{4}$. Several variations are noticed in the chassis parts and the body lines are radically different. Four models make up the R. & V. line for 1920, these being the six-cylinder, four-passenger coupe, seven-passenger sedan, seven-passenger touring car, four-passenger sport. These are all mounted on the same chassis, having an engine with 260 cubic inches piston displacement and a wheelbase of 127 inches.

The Briscoe Motor Corporation, Jackson, Mich., embodied improvements mechanically and also in the body and finishing of its 1920 Briscoe models. Chief among these are the removal of the

foring straight line drive to rear axle; bodies square back.

Dorris Motor Car Co., St. Louis, Mo., showed four body models on one chassis.

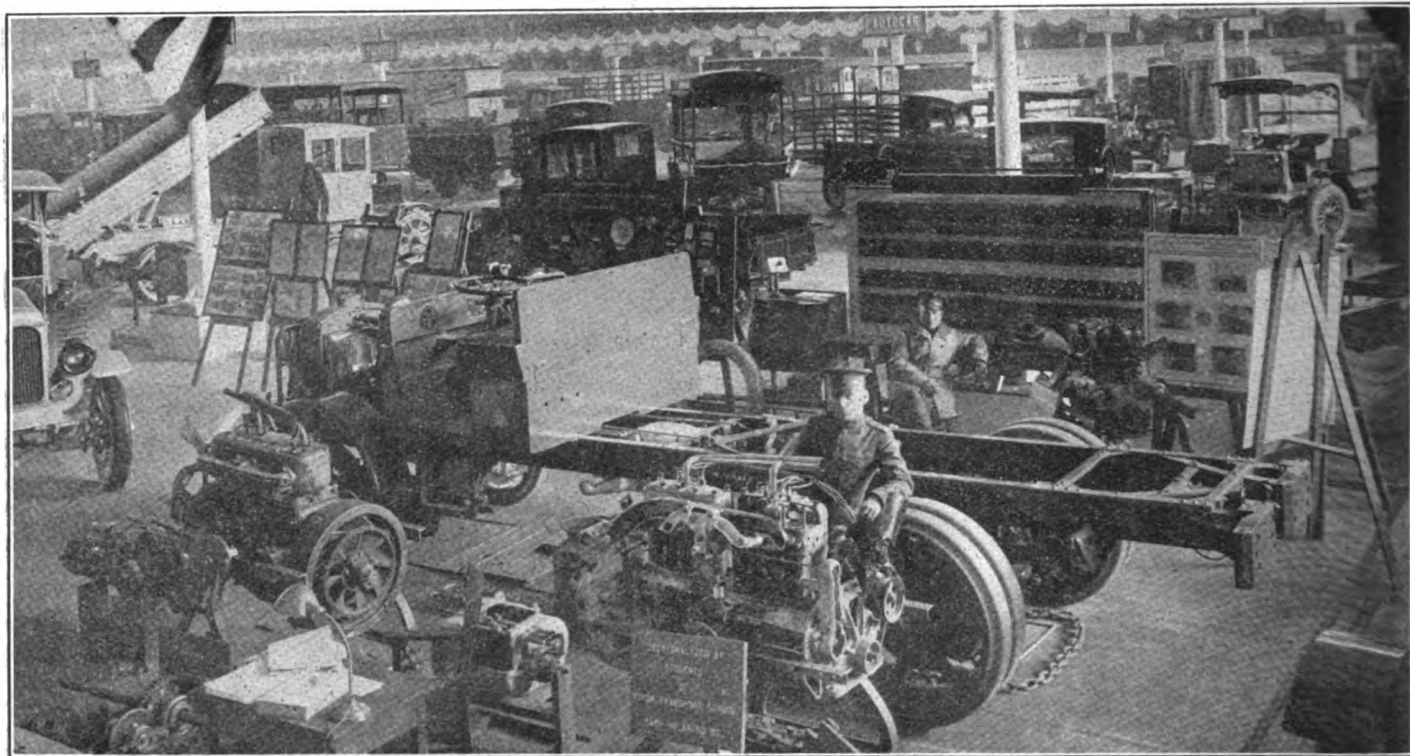
The Anderson Motor Co. is mounting its car bodies on standard chassis, utilizing a Continental Red Seal engine. The rear axle is a Salisbury; clutch is a Borg & Beck, transmission a Durston, drive is Hotchkiss and the universal joints are Thermold. Cooling is by Fedders radiator, carburetor a Rayfield, fed from a Stewart vacuum tank; ignition is Remy and the storage battery is a Willard.

CHANGES IN PERSONNEL.

The Black & Decker Co., manufacturer of portable electric tools, Towson Heights, Baltimore, Md., has just closed a deal for an office and show room at 1436 South Michigan avenue, Chicago, which will be opened about Feb. 1. R. G.

ALFRED REEVES ON SERVICE.

Alfred Reeves, manager of the National Automobile Chamber of Commerce, in the course of a recent address before a convention of the service men of Nordyke & Marmon Co. dealers in Indianapolis, Ind., stated that service will be the most vital function of the automobile industry in succeeding years. "During 1920," he said, "there will be 2,500,000 new cars produced in America, and a billion dollars has been appropriated for roads on these cars. It will be the service man's job to keep this immense transportation system in constant operation. The automobile in fact will be our only transportation salvation for some years to come, as the railroads and trolley lines and street cars cannot be expanded rapidly enough to take care of the ever increasing transportation crisis with which we are faced."



General View of Truck Section, Eighth Coast Guard Armory, Showing United States Motor Transport Corps Exhibit in the Foreground.

transmission from a position in a unit with the rear axle and making it a unit with the power plant. The wheelbase has been increased to 109 inches and the body is a bevel line.

The Barley Motor Car Co., Kalamazoo, Mich., showed new models. The feature is the body work on the sedan, limousine, landaulet and town car models by Rubay, while the cabriolet and suburban are built by the Barley Co. The Roamer models still embody low-hung lines. Wide seats are another feature.

The Lewis Spring & Axle Co., Chelsea, Mich., showed improvements in the new model Hollier, as follows: Wheelbase, four inches longer, giving the body an additional six inches; Westinghouse double unit starting and lighting system with ammeter on dash; Zenith carburetor; power plant lowered in frame, af-

Ames, the Chicago manager, will be in charge. J. N. LaBelle, formerly of the Edward A. Cassidy Co., will be office manager, and Robert D. Black will be assistant sales manager.

M. E. Lilley, who has been covering the Baltimore territory, has been appointed assistant manager of the Baltimore branch office.

F. W. Proctor has been appointed assistant to Mr. Decker in connection with the Loadometer division of the engineering department, and E. M. Stuart succeeds Mr. Proctor as service manager.

C. S. Hildebrand has been put in charge of the repair section of the service department.

Richard Schimmel has been advanced from chief tester to the experimental and development division of the engineering department.

CAMERON TO ENTER SPEEDWAY RACE.

Harry Doherty, general sales manager of the Cameron Motors Corporation, Shelton, Conn., and New York City, announces the intention of his company to make entry for the Indianapolis 500-mile race of May 31 next. Either two or three cars will be entered, it is reported. The new Cameron stock model complies with the new rulings regarding cylinder displacement in that it is just 183 cubic inches. To late comers in the automotive field this announcement may be of only passing interest, but to those who witnessed and recall famous racing events of earlier days it will be noted, for E. S. Cameron and his associates were participants in contests from 1904 to 1912 and were successful to a marked degree.

HUMOROUS SIDE OF MOTORING

EQUAL TO THE OCCASION.

"Has this car got a speedometer?" asked an old gentleman to the auctioneer.

The auctioneer was equal to the occasion and replied:

"At 30 miles an hour it exhibits a white flag, at 40 miles a red flag, and at 50 miles a gramophone begins to play, 'I'm going to be an angel, and with the angels dwell.'"

FORGOT THE ENCLOSURE.

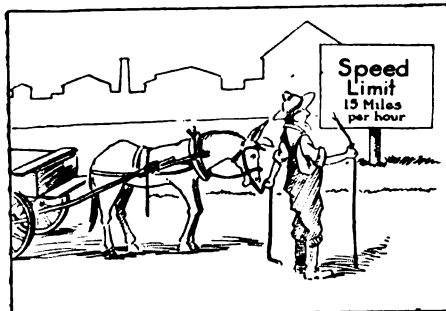
Uncle Eben—I just had a letter from an automobile fellow saying as how he wants to sell me an enclosed flivver.

Uncle Ezra—Are you goin' to buy it?

Uncle Eben—I dunno. I got the letter all right, but there warn't no flivver enclosed.

WOULD DO THEIR BEST.

With much whip-cracking and cries of encouragement the old man had at last



got his donkey cart to the outskirts of the town. Then his jaw dropped as he read on a sign board: "Speed Limit, 15 Miles Per Hour."

He stood a moment in silent meditation and then drawled out to his donkey: "Wall, I know we'll never make it, Maude; but we'll do our best."

CONFIDENCE IN CAR.

It happened recently that the pastor of one of the leading churches in a western city took for the subject of his sermon, "Better Church Attendance." The preacher argued that the automobile has taken more people away from church than any other thing. He concluded with the exclamation: "The Ford car has taken more people to hell than any other thing that I can mention!" Whereupon an old lady in the congregation began to clap her hands and moan, "Praise the Lord! Praise the Lord!"

"What's the matter, sister?" asked the pastor.

"The Ford never went any place that it couldn't make the round trip, and I am sure that all of those people in hell will be back," she answered. "So praise the Lord."

DETOUR.

(The Longest Distance Between Two Points.)

The trail to somewhere lures me on,
My old boat answers like a song;
Macadam miles appear, are gone—
And then a sign post looms up strong:

"Detour!"

I'm hitting fifty on all eight;
The motor purrs and gobbles gas;
We're on our way, the hour is late,
A wooden finger points, alas—

"Detour!"

I oftentimes think that when I'm due
To take the great eternal jaunt,
The road to pearly gates I'll view
For miles ahead and then, Avaunt!

"Detour!"

—Hal O'Rann in Empire Tire Dealer.

THE LATEST ATTACHMENT.

"Briggs is always seeking new attachments for his motor car."

"He has one now that will hold him for a while."

"What kind is it?"

"One furnished by the sheriff."—Brooklyn Citizen.

GENTLE LIKE.

"A grinding application of the brakes does a car no good."

"In other words, you've got to handle a car as you would bad news."

"Brake it gently."—Kansas City Journal.

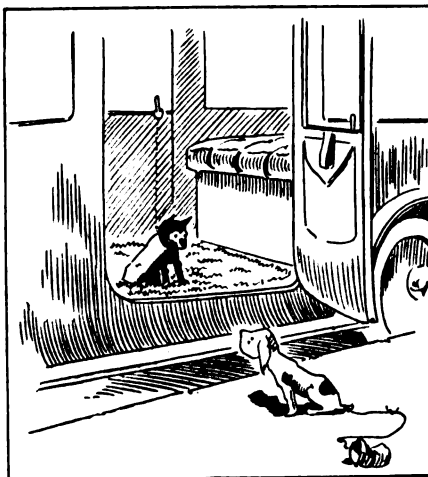
HIGH COST OF LIVING.

Railroad Official—After my salary was cut I had to advertise my limousine for sale.

"Get any inquiries?"

"Yes, from two conductors and a section hand."

"WHEN A FELLAR NEEDS A FRIEND."



NO SUCH CAR.

The teacher was trying to give her pupils an illustration of the word "perseverance."

"What is it," she asked, "that carries a man along rough roads and smooth roads, up hill and down, through the jungles of doubt and though the swamps of despair?"

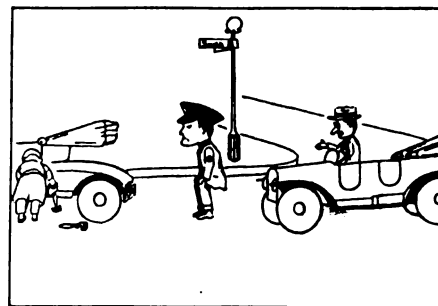
There was a silence and then Johnny, whose father was an automotive dealer, spoke up.

"Please, ma'am," he said, "there ain't no such automobile."—Pittsburgh Chronicle-Telegraph.

THE YEAR IT WAS MADE.

Every day the same aged motor car snorted wearily along and broke down in the thick of the traffic.

"Look here," said the traffic policeman, "this thing is always breaking down



about here. Let's see; what's your number? Yes, 1599."

"G'wan!" said the driver of the next vehicle in the block. "That ain't its number; that's the year it was made."

YOU NEVER CAN TELL.

Mrs. Redd—Where are we going to stop for lunch, dear?

Mr. Redd—Well, we'll have to stop for gasoline first, and it all depends upon what they charge in that particular town for gasoline whether it will be worth while to stop for lunch or not.—Yonkers Statesman.

THE FLORIDA TOURIST.

He came when winter began up North,
To keep from buying coal for fire.
He rattled down with a clean white shirt,
A five dollar bill and an extra tire.

He toured the state in his own good style,
And left when the winter snows were done.

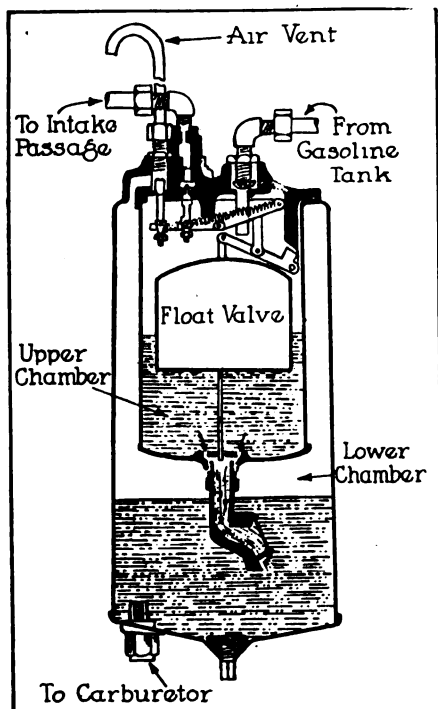
With the shirt, the bill and the extra tire—

For he hadn't changed a single one!

Care and Maintenance of Stewart Vacuum System

STEWART vacuum gasoline system consists of a small tank, installed under hood, connected by brass tubing to intake manifold, gasoline supply tank and the carburetor. Every engine draws its supply of fuel through the carburetor by the pumping action of the pistons, and the suction of the pistons serves with this system.

The vacuum tank consists of two chambers, the upper the filling chamber and the lower one the supply chamber. Between the chambers is a partition in which is a valve. The suction of the pistons on intake strokes creates a reduced pressure in the upper chamber, and this



Sectional View, Stewart Vacuum Fuel Tank.

closes the valve and draws gasoline from the main tank. As gasoline is drawn into the upper chamber it raises a float valve, which at a certain height operates a valve which shuts off the suction and opens an air valve. The admission restores the air pressure, causing the valve in the lower chamber to open, through which gasoline flows. The lower chamber is always at atmospheric pressure and the gasoline should be fed to the carburetor in a perfect, even, uninterrupted flow.

In making repair to this system there is little probability it will be necessary to open the tank, but if it is opened, follow directions carefully. Before undertaking repair make sure that failure is not due to some other cause than the condition of the tank. If the system does not function satisfactorily the following suggestions are made to make adjustment:

Vent tube overflows—The vent tube maintains atmospheric pressure in the lower chamber and prevents overflow of gasoline while descending steep grades. If a small quantity of gasoline escapes no

adjustment is needed.

However, if the vent tube constantly overflows one of the following causes may obtain:

(a) The air hole in main gasoline tank filler cap may be too small or may be stopped. If the hole is too small enlarge it to $\frac{1}{8}$ inch diameter, or if obstructed, clean it.

(b) Overflow can be prevented by attaching a length of tubing to the vent connection and carrying it to the highest point under the hood.

If gasoline leaks from the system, except from the vent tube, it may result from one of the following causes:

(a) A leak in outer wall of tank, which soldering the hole will eliminate.

(b) Carburetor connection in the bottom of tank may be loose and should be screwed tight.

(c) There may be a leak in the tubing, which soldering will repair. Failure to feed gasoline to the carburetor may be due to other causes than the condition of the system. If you can flood the carburetor the feed is functioning properly.

Another test is to take out the inner tank and fill the outer shell with gasoline. If fuel is not fed then the cause clearly is elsewhere, for the gasoline must flow from the open, elevated tank unless the connection to the carburetor is clogged.

To remove the top of the tank, after taking out the screws, run the blade of a knife carefully around it, between the cover and the body of the tank to separate the gasket without damaging it. The gasket is shellacked to make an air tight joint.

If failure to feed is traced to the system one of the following conditions may be the cause:

(a) The float, which should be air tight, may leak and not rise sufficiently to close the vacuum valve. This will cause gasoline to be drawn into manifold, which will choke the engine.

Proper operation depends upon this float being air tight.

To repair the float. Remove the top of the tank (to which float is attached) as above directed. Dip the float into a pan of hot water. Bubbles will arise from the leak, which should be marked.

Punch two small holes, one in the top and the other in the bottom of the float, to permit the discharge of gasoline. Then solder these holes and the leak. Test the float by dipping in hot water. If no bubbles are seen the float is air tight.

In soldering float, be careful not to use more solder than is necessary, for solder will add to the weight and make the float too heavy.

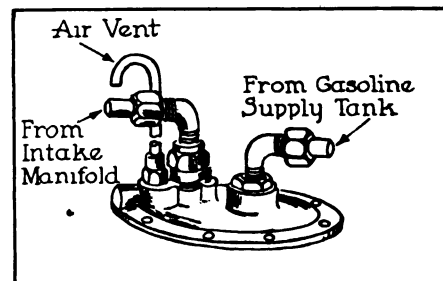
When taking out the float do not bend the float guide rod. If the rod is bent it will strike against the guide and cause the same effect as a leaky float and allow gasoline to enter the manifold. See that the surface of the rod is perfectly smooth, so that it cannot be retarded by the guide.

To compensate for a leaky float until you can reach a place for repairing, remove the plug on top of the tank where

it may be filled by hand. In some cases the suction of the engine may draw gasoline into the tank, even with the plug out, but will not draw fuel into the intake manifold. If, however, you are not able to do this, screw in the plug with the engine running. This will fill the tank. After the tank is filled remove the plug. The gasoline in the tank can be used until it is emptied. Continue this till a place is reached where the float can be repaired.

(b) The flapper valve may not function. A small particle of dirt under the valve in the bottom of the upper tank might prevent it seating and the system be inoperative until it is removed.

To determine whether or not the flapper valve is not seated, first plug the air vent and then detach the tubing from the bottom of the tank and the carburetor. Start the engine and apply the finger to this opening. If suction is felt continuously there is a leak in the connection between the tank and the main gasoline supply, or else the flapper valve is



Top Removed, Stewart Vacuum Tank.

off its seat and air is entering the tank, instead of gasoline.

In some cases tapping the side of the tank will shake loose the obstruction in the valve. If this does not prove effective, remove the tank cover, as previously described and lift out the inner tank. The flapper valve is screwed into the bottom of this tank.

(c) Manifold section, the short pipe leading from the tank to the carburetor, may be loose and air may be drawn into the manifold.

(d) The tubing may have become stopped.

(e) The gasoline strainer on the top of tank, at the end of large feed pipe from the main tank, may be clogged. This screen prevents foreign substances being carried to the carburetor. If the system fails this screen may be clogged. The screen may be easily cleaned by unfastening the connection at the elbow. This cleaning should be done every three weeks. If the tank should fail to operate first examine the strainer.

If there is an increase in gasoline consumption, perhaps the cause is:

(a) The carburetor may need adjustment.

(b) The vent tube may overflow frequently.

(c) There may be a leak in tank or tubing.

(d) If the engine accelerates when the vacuum tank is drawing fuel from the main supply it shows that either the car-

buretor mixture is too rich or the connections are so loose that air is drawing into the manifold. There should be no perceptible change of engine speed when the tank is operating normally.

Carburetor trouble:

(a) Carburetor trouble cannot possibly be attributed to the vacuum system. If the gasoline is delivered to the carburetor, the vacuum system is operative.

(b) If the carburetor pops and spits adjustment is needed.

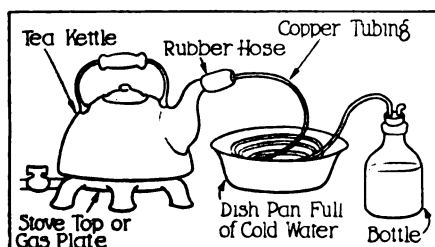
(c) If the car accelerates, or if you cannot get the usual car speed while running with open throttle, although the car engine will run, the cause is not the vacuum system. If all the gasoline in the vacuum tank is exhausted the car will stop.

To fill the tank, should it become empty, with the engine throttle closed and the spark off, turn the engine over a few revolutions. This takes less than 10 seconds and will create sufficient vacuum to fill it. If the tank has been empty for a time and does not easily fill when the engine is turned over, this may be caused by dirt or sediment under the flapper valve. Or, perhaps, the valves are dry. Removing the plug from the top of the tank and squirting a little gasoline into it will wash the dirt from this valve and wet the valves. Then the system should operate immediately. The flapper valve may sometimes be held from its seat by carbon adhering to it. In such a case the valve should be scraped with a knife.

Look over the connections to see that they are absolutely tight. The coupling and elbow connections should always be screwed tight. Care should be taken that the tubing is not bent so as to retard the flow of gasoline.

MAKING DISTILLED WATER.

An arrangement is shown in the illustration that has been found very satisfactory for making distilled water for the storage battery on a small scale. The device consists of an ordinary tea kettle in which water is boiled, gas plate, pan, a coil of metal tubing and a bottle or container in which the distilled water collects as it condenses. Fill the tea kettle half full of water, light the gas burner under the gas plate, connect the metal coil by means of a section of rubber tubing, immerse the coil in the pan containing cold water and connect to the stoppered container. As the water in the kettle boils the steam will rise into the spout, pass into the coil, become cooled and condensed by the cold water, and pass as distilled water into the bottle container, driving out the air through the short glass tube in the stopper.



Mechanical Hints for Motorist and Repair Man

WATCH TIRES WHEN CAR IS LAID UP FOR WINTER.

Many automobile tires are put into storage with thousands of miles of wear left in them, and car owners should take the few precautions necessary to keep them from damage while not in use. Here are some recommendations made by the service department of a big tire company:

1. Wash tires carefully on outside to remove oil and other harmful substances.

2. Remove tires from wheels and wrap in paper or old carpet.

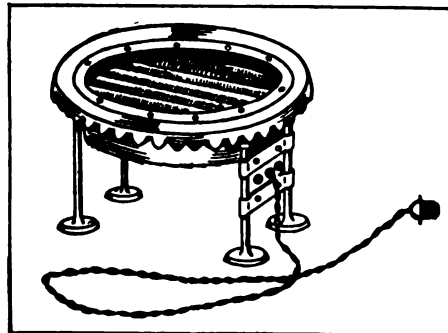
3. Store in a cool, dry place away from light. Heat, light and moisture are enemies of rubber.

4. Cold has no bad effect on tires if properly protected.

5. If tires are left on car, jack up car, deflate tires and wrap in covers.

TO MAKE AN ELECTRIC STOVE.

Many uses may be found for the discarded parts of a Ford car among which is the making of an electric stove. The frame is formed from a discarded bevel

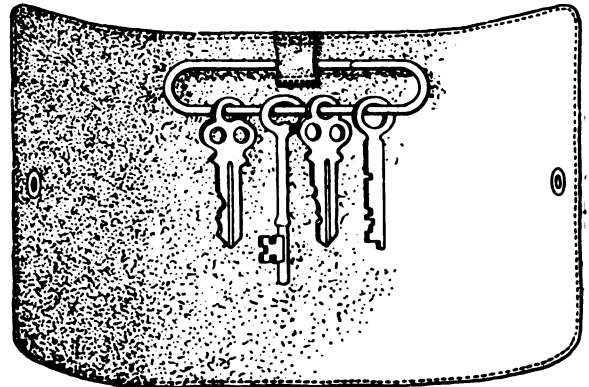


ring from the Ford differential and the legs are valve stems. The stove is suitable for frying and toasting and is operated on a 110-volt alternating or direct current.

A section of heavy asbestos building material or very thick asbestos paper is fitted inside the bevel ring. The four valve stems, forming the legs, are threaded and screwed into the holes, which are already made in the frame. A nut with a washer is placed on each leg to support the asbestos, which contains a resistance coil composed of 25 feet of No. 20 nichrome wire wound in form of a spring. This is fastened down by a piece of brass wire wound over the spring and inserted in drilled holes in the asbestos support, under which the wire is clamped. Two strips of sheet brass stretching between two of the legs support another piece of asbestos having a hole drilled through the center, allowing the wires to pass through, connecting the stove by means of a cord and plug to the house lighting circuit. This stove may be attached to any ordinary electric light socket and consumes a small amount of current.

CARRY A KEY CASE.

A convenient key case can be made from a few cents worth of leather substitute that may be purchased from department stores or jobbers in automobile

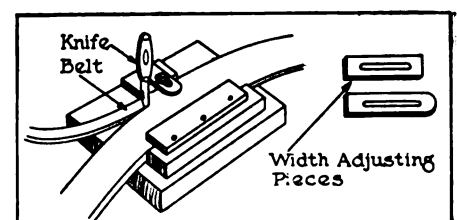


supplies. The illustration shows clearly how the keys are placed on a wire loop that is slipped into a loop at the top of the case. Snap fasteners are provided for fastening the ends of the case, preventing the keys from wearing holes in the pocket or getting lost. The edges of the leather substitute should be stitched on a sewing machine to present a more finished appearance.

BELT CUTTING DEVICE.

A device for cutting different widths of leather belting or narrow strips for fan belts is made as follows: At one corner of the work bench fasten a narrow strip of straight edge board about 10 inches long and four inches wide. On this strip nail a half inch strip of board eight inches long and four inches wide, with one edge overlapping the lower board by one or 1½ inches. Figure the width of the stock which you are going to cut up and lay off the proper distance, say four or five inches; nail on a second strip about four by four inches and drill a hole through this board and the bench through which place a bolt with the nut at the top. A carriage bolt will do very well as the square shoulder of the bolt can be drawn into the under side of the bench and will keep the bolt from turning. Over this bolt fit a metal guide as shown in the illustration, having a slot cut in it, so that it may be adjusted for the width you may wish to cut the belt. Place a knife blade in the bench, point down, with the edge towards the belt, and draw the belt forward, against the edge.

Gasoline sells for 75 cents a gallon in Buenos Aires, Argentina.





Foreign Trade Mark Piracy Cases

THE American Manufacturers' Export association, through its patent and trade mark committee, has taken action with a view to bringing about relief in the serious situation of trade mark piracy. Acting with the National Automobile Chamber of Commerce, an appeal has been sent to the state department at Washington asking the United States ambassador at Portugal to protect the interests of those manufacturers whose trade marks were appropriated by Manuel Silva Carmo of Oporto, Portugal. This, under Portuguese law, he is entitled to do, although it is indicated that an opportunity is granted for the interposition of objections by any whose interests may be injured.

The American Manufacturers' Export association has repeatedly warned exporters of the danger of doing business without protecting their trade marks. The Portuguese registration of American trade names was discovered by an international patent attorney upon his attempt to register the names Jordan and Mercer at Oporto. Not alone was it found that these names had already been entered for registration by Carmo, but that a long list of others was equally endangered, so far as their real owners are concerned. Among those reported by cable are: Chandler, Bartholomew, Vellie, Cole, Grant, Chalmers, Paige, Auburn, McFarlan, Saxon, Kissel, Dorris, Stutz, Mitchell, Moline, Hackett, Maxwell, Monroe, Chevrolet, Lexington, Winton, National, Stearns, Westcott, Hal, White, Moline Plow, Jackson, Haynes, Elkhart, Oakland—in all there were 43.

The pirating of American trade marks is not limited to any particular country. Hundreds of American trade marks are appropriated throughout the world. Only recently the registration of the words "India Rubber" as a trade mark in Argentina was successfully opposed. If this trade mark had not been registered it would have enabled the person who registered this mark to confiscate any goods shipped into Argentina marked with the words "India Rubber."

Only a few weeks ago an attempt was made in Spain to register the trade mark "Peerless," "Selden" and "F. W. D." for automobile trucks, "Corona" for typewriters, "3-in-1" oil and "Havoline" for

lubricants. In Cuba, within the last month, "Diamond Grid" for storage batteries, "Kirschbaum" clothes, "Fashion Park" cloth, "Kissel Kar" and "McFarlan," "Commerce Trucks" in Uruguay; "Coca-Cola" in Japan; "A. C." spark plugs in Japan; "Marmon" and "Stutz" in the Argentine Republic. The list could be added to indefinitely.

It is stated, however, that in view of the patent and trade mark provisions of the peace treaty, it will be possible upon ratification of the treaty to recover all the trade marks pirated in Portugal, owing to an extension of the International Trade Mark convention, to which this country is a party.

AN ENGLAND WITHOUT RAILS.

Brigadier-General Charles B. Drake, chief of the United States army motor transport corps, predicts that England is destined within a few years to become "a nation without railways, or with railways supplementing a highly developed system of motor transportation." This forecast can be made with reason after a study of the recent railway tie up in England.

"Because of the efficiency of the system of transportation by motor that was devised under the compulsion of necessity," says General Drake, "the life of the nation was not thrown out of joint entirely and the strike itself, in consequence, fizzled out."

CARS IN THE PHILIPPINES.

During the past year of record there were 4326 cars of 144 different makes registered in the Philippine bureau of public works, which has the oversight of the licensing of motor vehicles in those islands. Considering the most popular car from the viewpoint of passenger capacity, the five-passenger car stands far in advance, with a total of 2153 cars. The seven-passenger ranks second with 1171 registrations; next in order come the two-passenger, 459; four-passenger, 181; eight-passenger, 108; three-passenger, 107; six-passenger, 94; 10-passenger, 37; nine-passenger, 16.

WILL DEAL IN AUTOMOBILES.

The Eagle Star & British Dominions of London, England, is to open an automobile department through its United States manager, Fred S. James & Co.

Canadian Programme of General Motors

The General Motors Corporation is extending its Canadian construction programme. The already extensive building operations now in progress at Walkersville, Ont., is being expanded to permit of the manufacture of transmissions. Howard E. Blood, general manager of the Canadian Products, Ltd., the Canadian subsidiary of the General Motors Corporation, recently announced that an additional department will be added at Walkersville to those already planned. Plant No. 1 will be used for the manufacture of automobile motors and for office space. Plant No. 2 will be used for production of axles and tools.

The plants are of most modern construction. There is being shown an increasing tendency to make more desirable working conditions and the Canadian Products plant is an outstanding example of this. A lighting system of maximum efficiency is being installed throughout the various buildings, and in addition to this, ceilings and structural supports are painted white. Ventilation is also provided along scientific lines. The power and heating plant, costing approximately \$175,000, is nearing completion. Construction of huge oil tanks to hold 60,000 gallons is under way at the rear of plant No. 2. A maintenance building for the repair of electric motors and plant equipment will be built.

The Walkerville site is 38 acres in extent. The expenditure there is estimated at \$6,000,000, and the entire appropriation of the corporation for extensions this year in the United States and Canada was \$37,398,000.

MOTOR ROAD FOR BRAZIL.

An improved automobile road is being constructed between Rio de Janeiro and Petropolis, Brazil, and this highway, 25 miles long, is expected to prove one of the most popular drives in South America, as it affords fine panoramas of the surrounding country.

Cuba is discarding the historic two-wheeled mule cart for the American motor trucks in connection with the big sugar industries.

Trade Opportunities in the Foreign Field.

Reserved addresses may be obtained from the United States Bureau of Foreign and Domestic Commerce, and its district and cooperative offices, upon written request by opportunity number.

31,741—A commercial agency firm in Mesopotamia desires to secure from manufacturers the sole agency for a motor car suitable for that country, belting, machine tools and engineering supplies generally, and also typewriters.

31,729—An engineer from Sweden, who is in the United States, desires to secure agencies for the sale of automobiles and accessories, refrigerating machines, electrical goods and hardware. References.

31,673—A company in Ireland, which is now building a public garage and automobile repair shop, desires to purchase and secure an agency for the sale of garage equipment, automobile accessories and ice making machines. Payment, cash against documents. References.

31,653—An American trading company, with branches in the Netherlands, Germany and France, desires to secure an agency from manufacturers for the sale of automobiles, bicycles, motorcycles, automobile sundries, tires, cigarettes, oils, food stuffs and general merchandise.

31,700—A retail dealer in France desires to purchase bicycles and accessories, motorcycles, light motor cars, trucks and accessories. Correspondence may be in English. Reference.

31,702—A merchant in Germany desires to purchase and secure an agency for the sale of novelties in accessories

and equipment in the automobile and aeroplane industries. Correspondence may be in English. Reference.

31,709—An agency is desired by a firm in Italy for the sale of automobiles and accessories, railway material, office supplies, artificial leather, electric lamps, electrical supplies and novelties. Correspondence should be in Italian or French. Reference.

31,726—A firm in India proposes to start a freight and passenger transportation service and desires to purchase or secure an agency for a large number of motor trucks and automobiles for pleasure cars. Quotations should be given f. o. b. New York. References.

31,678—An importer in Belgium desires to secure automobiles, accessories and tractors. Reference.

31,625—A firm in Spain with garage and store desires to receive catalogues and price lists of automobiles and accessories, bicycles, motorcycles, tires, etc., with a view to securing exclusive agencies. Correspondence and catalogues may be in English, but Spanish is preferred.

31,566—A mercantile agency firm in Portugal desires to secure agencies and receive goods on consignment, and also import on own account for the sale of raw cotton, anilines and other dyes, agricultural implements and machinery, surgical supplies, novelties, shirtings, silk for neckwear, haberdashery, automobiles and accessories, including tires, and any other lines which will find a market

in that country. Correspondence may be in English. References.

31,412—Agencies are desired by a firm in the Netherlands for the sale of automobiles, motorcycles, tires and accessories and general industrial machinery and supplies. Reference.

31,542—A firm of exporters and general commission merchants in India desires to represent manufacturers of hardware, engineers' tools, galvanized and iron pipes, boiler fittings, mill machinery, railway stores, cotton mill and gin stores, colors and dyes, provisions, perfumery, wines and spirits, cotton piece goods, hosiery, electrical fittings and accessories, dynamos and motors, motor cars, boots and shoes, glass ware, bedsteads, millinery and general sundries. Reference.

31,425—A commercial agent from Peru is in the United States and desires to secure agencies for the sale in Bolivia and Peru of shoes, drugs, chemicals, steel, textiles, food products, automobile accessories and tractors. Reference.

31,434—The representative of a firm in Mexico is in the United States for a brief visit and desires to secure an agency from manufacturers for the sale in Mexico of rubber tires and agricultural implements. References.

31,455—There has been received an urgent request from a company in Smyrna for quotations c. i. f. that city, on three three-ton automobile trucks of the dumping type, with double solid rubber tires, for the transport of emery stone.

LONDON-TO-PARIS AIRPLANE IS SUMPTUOUS.

The first of the real commercial passenger-carrying airplanes has just been put into service on the London-to-Paris run. Hitherto most of the machines which have been blazing the trail for aerial commerce have been converted military planes.

The type of car that has just been commissioned is furnished with all the luxuries of a Pullman coach, with a fine salon fitted with carpets and 15 windows. The passengers sit in velvet-cushioned arm chairs, with receptacles at their elbows for maps, books and papers. A handsome clock and ornate mirrors give a tone of elegance to the interior, which is lighted by electricity.

In addition to wireless telegraph there is a wireless telephone equipment connecting with land stations. There are also a spacious luggage room and pilot's cockpit. The machine is designed to carry 4800 pounds when fully loaded. The plane is propelled by two engines of 450 horsepower.

The London-to-Paris service is now in its fifth month, with increasing patronage, both passenger and freight.

FRANCE CUTS IMPORT DUTY.

On Dec. 26 the duty on automobiles and parts imported into France was reduced

from 75 per cent. ad valorem to 45 per cent., and it is announced that a further reduction is possible.

The report on which the decree of reduction in duty is based states that the automobile industry of Belgium, Italy, England and France is agreed that a uniform tax of 33 1/3 per cent. should be exacted between these countries, but as the American tariff is 45 per cent., the French duty is reduced only to that figure with the understanding that a further reduction to 33 1/3 per cent. is possible if the United States will make the same concession.

DEMAND FOR CARS IN CANADA.

According to information from Winnipeg, Manitoba, Can., the demand for automobiles in the Canadian provinces is so great that American factories will be unable to meet the demand for 1920 cars. It is estimated that Canada will spend at least \$10,000,000 for motor cars during the year.

FIAT EXPANDING FOR EXPORT.

The Fiat Co., which is capitalized for \$40,000,000, has started in on a world-wide campaign of agency organization. More than 85 agencies have already been established in Europe, Asia, Africa, Australia and Central and South America.

BIRMINGHAM CO. TO MAKE 20,000 CARS YEARLY.

One of the principal motor vehicle manufacturers of Birmingham, England, having increased his capital to \$15,000,000, is reorganizing and enlarging his plant with a view to a quantity production of three models, a light car, a touring car and a six-cylinder model. It is planned to raise the production to 20,000 cars annually.

FIRESTONE FACTORY IN SINGAPORE.

The Firestone Tire & Rubber Co., Akron, O., is to erect a \$1,000,000 plant in Singapore, and for this purpose a subsidiary company has been formed known as the Firestone Tire & Rubber Co. of Singapore, with a capital of \$1,000,000. It is reported that several thousand acres of land have been purchased in that country and that contracts for construction of buildings and machinery are being let.

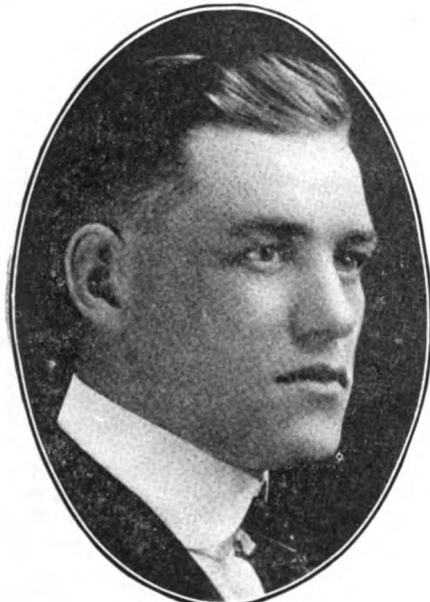
BUILD CARS IN ENGLAND.

The Willys-Overland Crossley, Ltd., London, England, which was formed for the mass production of Overland cars at the Crossley Works in that country, is to issue £1,000,000 (\$5,000,000) of 10 per cent. preferred stock of which American interests are taking about \$1,500,000.

Personal News of the Industry in Brief

Townsend Goes to Hooven Co.

R. H. Townsend, for the past six years general construction superintendent for the L. L. Nunn interests, has gone to the



R. H. Townsend, Made Chief Engineer of the Hooven Radiator Co.

Hooven Radiator Co., Chicago, as chief engineer, for which position he is well qualified by thorough technical training and wide industrial experience. The Hooven company is preparing to move to more extensive quarters.

Joseph E. Clinton is district sales manager of the Milwaukee Tank Works, Milwaukee, Wis., making his headquarters in Athens, Ga., and is one of the best known salesmen in that section of the country.

E. H. Baker, president of the Cole Motor Car Co., Indianapolis, Ind., was a guest at the recent dinner given in New York in honor of the Prince of Wales, at which Chauncey M. Depew presided.

A. M. Reid, sales representative of the Curtis Airplane & Motor Corporation, New York City, was recently at Baltimore assisting in the aeroplane department of the Central Automobile Co., the agent of the Curtis Co. in that city.

E. R. Peckham, formerly service manager at Newark, N. J., for the Packard Motor Car Co. of New York, has been appointed superintendent of the Long Island City service station of the Packard Co.

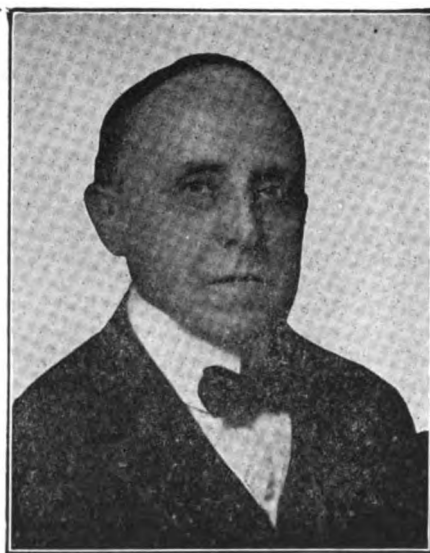
Fred W. Goodes, the newly elected manager of the Baltimore Republic Truck Co., was the guest of honor at a luncheon recently given by the sales force of that company at the Walbert hotel in that city.

K. D. Alexander has been appointed assistant superintendent of the automobile department of the Newark, N. J., branch office of the Aetna companies. Mr. Alexander was formerly in the same department at the home office of the company.

G. Lindstrom has been appointed works manager of the plant at Bethlehem, Pa., of the Roller-Smith Co., 233 Broadway, New York, maker of electrical instruments, meters and circuit breakers. Mr. Lindstrom is a graduate of the Royal Institute of Technology at Stockholm, Sweden, having secured the degree of M. E. in 1906 and E. E. in 1907, since which time he has held the following positions: In the drafting department of the Westinghouse Electric & Manufacturing Co., East Pittsburgh, Pa.; chief engineer with the Ohio Sterling Co., Dayton, O., and the Electric Products Co., Cleveland, O.; production manager with the S. K. F. Ball Bearing Co., Hartford, Conn., and with the same company in Gothenburg, Sweden.

A. G. McMillan, formerly eastern sales manager of the Automobile Service Station Equipment division of the Fairbanks Co., New York City, has been appointed general sales manager of that division to succeed H. B. Garvey, resigned. This appointment adds sales in the Far West to Mr. McMillan's responsibilities. His headquarters will be in New York, although western sales were formerly handled from Chicago.

Charles Ethan Allen has been appointed general manager of the Eisemann Magneto Corporation, succeeding W. E. Steinback, resigned. Mr. Davis is a graduate of Worcester Polytechnic Institute and after spending several years as a construction engineer in Hartford, Conn., and Chicago, he became sales manager of the Pratt & Whitney Co., Hartford, and later factory manager of the Illinois Sewing Machine Co. Other activities of Mr. Davis in this field have included the positions of works manager and later general manager of the American Locomotive Co., general manager of the Warner Gear Co., manager of the Walco Co., general manager of the Simplex Automobile Co. and member of the technical section of the Army War Claims board at Washington, D. C.



Charles Ethan Davis, New General Manager of the Eisemann Magneto Co.

Ben Lewis on Automobile Row

Ben Lewis, formerly in the men's furnishings business in the New York City automobile district, has become eastern



Ben Lewis, Eastern Representative Ford Mica Co.

representative of the Ford Mica Co., 14 Christopher street, maker of the F. M. C. spark plug. Mr. Lewis' extensive acquaintance and popularity along the Metropolitan automobile row will undoubtedly secure for the F. M. C. plug a large clientele.

Emilen S. Hare, president of the Mercer Motor Co., Trenton, N. J., has been chosen president of the new Locomobile Co., Bridgeport, Conn. Associated with Mr. Hare with the Locomobile Co. are O. E. Hunt, formerly chief engineer of motor cars; H. S. Church, chief engineer of motor trucks; Henry Lansdale, car sales manager, and C. L. Guyman, government distribution manager, all of the Packard Motor Car Co.

L. D. Speed, who has been in the central western states representing the Northwestern Chemical Co., Marietta, O., manufacturer of Norwesco "Chemically Correct" utilities, was recently promoted to be central sales supervisor. Mr. Speed is an experienced salesman of automotive equipment, and will now have charge of the entire central section of the country for the Northwestern Co.

J. A. Benell, formerly special representative of the Haynes Automobile Co., Kokomo, Ind., has been promoted to be assistant general manager of that company.

Bennie Kauff and Jess Barnes of the New York Giants, have opened a store in the heart of Baltimore's automobile district and are specializing on United States tires.

Jay Dewey is now director of sales for the Lexington Motor Co., Connersville, Ind. He formerly served as manager of the Lexington branch at Kansas City.



Jay Dewey, Director of Sales, Lexington Motor Co.

Frederick H. Payne, formerly vice president of the Greenfield Tap & Die Corporation, Greenfield, Mass., has purchased the holdings of Frank O. Wells, president of that company. Mr. Wells retires as president and member of the board of directors, and has been succeeded by Mr. Payne. F. G. Echols, vice president and general manager, has been elected a director to succeed Mr. Wells, but the latter will remain with the corporation in an advisory capacity.

J. D. Smith, formerly works manager for the Timken Axle Co., has been appointed by Robert Enos, vice president of the Torbensen Axle Co., Cleveland, O., manufacturing manager of the Torbensen plant. G. W. Veale, formerly production supervisor for Timken, is to be production superintendent for Torbensen, and G. W. Carlson, formerly engineer for Timken, will assume the same title with the Torbensen company. All three of these officials have won high reputations as engineers and manufacturing executives.

R. Charles Brower has become associated with the sales organization of the Clark Tractor Co., 1122 South Michigan avenue, Chicago. He was formerly service manager of the Harrison Radiator Corporation, Lockport, N. Y. Before joining the Harrison organization Mr. Brower was traveling service supervisor of the Hyatt Roller Bearing Co., and eastern district manager of the Bearings Service Co.

W. J. Clucas, formerly of the Standard Parts Co., Cleveland, with which he was associated for many years, has been made manager of the Detroit sales office of the Lancaster Steel Products Co., Lancaster, Pa.

Harry Phelps, who spent a year in active service in France with the 302nd Engineers, 77th Division, has been made purchasing agent of the Atterbury Motor Car Co., Buffalo, N. Y.

H. D. Wilson has been elected vice president of the Herschell-Spillman Motor Co., North Tonawanda, N. Y., and will assume duties including a part of the general administration as well as the direction of the distribution of that company's product and initiation and supervision of the proposed extensive publicity campaign. Mr. Wilson's connection with the automotive industry dates back to 1902, when he joined the Olds Motor Works. His later activities included the offices of purchasing agent and foreign manager of the Packard Motor Car Co., sales manager of the Eisemann Magneto, Ferro Machine & Foundry and Bijur Motor Appliance companies and Dyneto Electric Corporation.

Charles F. Scribner, formerly industrial engineer with the Colt's Patent Fire Arms Manufacturing Co., Hartford, Conn., and more recently consulting engineer for L. V. Estes, Inc., Chicago, has become associated with the Business Service Corporation of America, Chicago, in the capacity of vice president and chief engineer.

W. R. Mason has been appointed by the Sanford Motor Truck Co., Syracuse, N. Y., as New England district sales manager, with headquarters in Boston; also Hamilton Clive has been made southern district sales manager, with headquarters in Atlanta, Ga.

Henry M. Stanley, who was connected with the Williams Motor Sales Co. of Springfield, Mass., has been appointed retail sales manager of Johnson Bros., Inc., of the same city, which company is western Massachusetts distributor of Auburn Six cars and the International truck.

O. L. Curtiss has taken charge of sales for the Ligonier Auto Body Co., Ligonier, Ind. Mr. Curtiss was formerly sales manager of the Racine Manufacturing Co., Racine, Wis.

Charles Hendy, Jr., has been promoted to the management of the Chicago division of the Ford Motor Co. He was formerly manager of that company in Denver, where he will be succeeded by Edward Afton.

J. L. Goodall, formerly manager of the Indianapolis branch of the Bearings Service Co. of Detroit, has been promoted to be New York branch manager for that company. R. N. Gauss will succeed Mr. Goodall as manager of the Indianapolis branch.

E. L. Stanley has become president of the Automotive Sales Co. of Lima, O. He was formerly with the Lima Oldsmobile Co. of the same city. The Automotive company will handle Reo, Monroe and Cleveland cars in that locality.

E. O. Garver has been transferred from the Preferred Tire Corporation of Illinois, Decatur office, to take charge of the Streator branch.

F. B. McCloskey has been put in charge of the Fireproof Garage, Troy, Pa. He was formerly machinist and electrician of Renova, Pa.

Benton Hopkins, formerly associated with the Austin Co., Cleveland, O., has been appointed advertising manager of the Denby Motor Truck Co., Detroit.

George W. Pontius, Jr., service manager for the Cleveland Tractor Co., Cleveland, O., is now in Europe for the extension of the service organization of his company in different countries. Mr. Pontius was in charge of the service department of the Studebaker Corporation when he entered the United States Army Transport Corps, and less than a year ago retired from government service and joined the Cleveland company.

George L. Sullivan has resigned as advertising manager of the Fisk Rubber Co., Chicopee Falls, Mass., to join the staff of the J. Walter Thompson Co., New York City, advertising agent. Miss M. G. Webber succeeds Mr. Sullivan at the Fisk Co.

C. F. Rouze, formerly assistant sales manager of the General Motors Truck Co., has been promoted to the head of the new sales promotion department of that company. M. J. Kates succeeds Mr. Rouze.

Lewis P. Kalb, well known in automotive circles, has been named assistant manager of the Stan-Par axle plants. Mr. Kalb was formerly a member of the Standard Parts Co.'s engineering staff.

C. A. Call has become sales manager of the Federal Corporation, Westfield, Mass., and will also have charge of the advertising in that company. Mr. Call was formerly manager of the eastern sales division of the Gurney Ball Bearing Co., Jamestown, N. Y.

C. J. Welch, who for 22 years has served as a sales executive with the Pope-Toledo organization, has been appointed sales manager of the gasoline division of the Oneida Motor Truck Co., Green Bay, Wis.

J. G. Vincent has been commissioned a colonel in the Officers' Reserve Corps, United States Army. He was formerly vice president in charge of engineering of the Packard Motor Car Co.

J. B. Cothran has resigned his position as manager of the Fisk Rubber Co., New York City. Mr. Cothran has been with that company for many years and no successor has yet been named.



George W. Pontius, Jr., Service Manager of the Cleveland Tractor Co.

Some New Features Shown in Wheels and Axles

STEEL WHEELS IN EUROPE.

Benjamin Briscoe of Briscoe & Stahl, Detroit, which specializes in the design of and purchase of parts and material for cars to be manufactured in France, has recently returned from attendance at the Paris automobile show. His observations there have led to the prediction that pressed steel wheels will generally supersede wood and wire wheels in Europe within a year, and that this will ultimately be followed by similar practice in this country and wheels of the steel type will eventually be as popular here as are wire wheels today.

Mr. Briscoe found that a most cordial reception was accorded the car designed by the Detroit concern of which he is the head, for Bellanger Freres of Paris, additional specifications for 2000 cars having been brought back by him, for which the parts will be purchased from American makers.

During his trip Mr. Briscoe also secured the American rights to the Breguet process for extracting gas from waste gases by condensation, by which benzole and other volatile liquids are obtained. He also placed with Bellanger Freres the distribution of Oldfield tires for all of Europe.

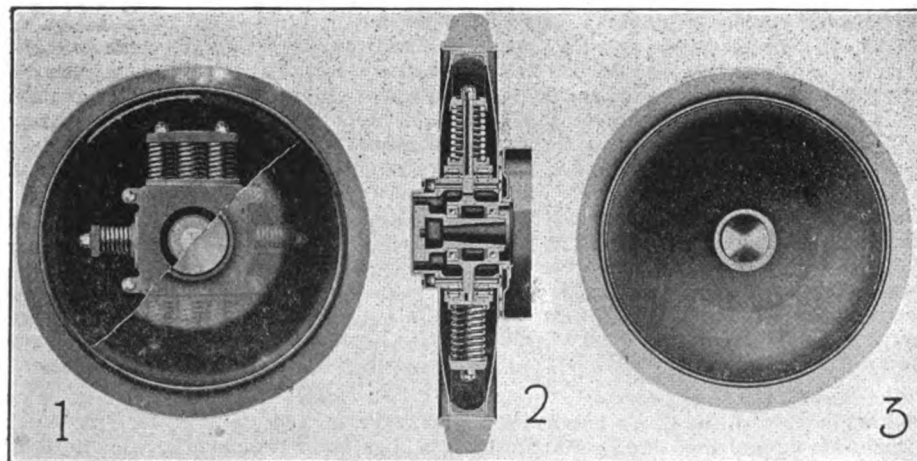
SHOW OF THE CAROLINAS.

At a meeting of the Charlotte, N. C., Automotive Trade association, held the evening of Dec. 15, at which Senator Hitchcock spoke, it was decided to hold an automobile show at that city, Feb. 9-13, to be known as the show of the Carolinas.

The show committee consists of Lee Folger, chairman; James Taylor and Joseph G. Fitzsimons; sub-committees, Osmonda Barringer, W. V. Wallace, W. T. Hoppe, Julian Herndon.

INDIAN FOR AUTOMOBILE.

W. L. Kissel, secretary and treasurer of the Kissel Motor Car Co., Hartford, Wis., is authority for the statement that the Navajo Indians of Utah have coined a name for the automobile. It is "Sinna-paschugy" and literally translated means "wagon that goes with a chuck."



Cornfield Resilient Wheel: 1, Sectional and Partial Phantom View, Showing the Mounting of the Suspension Unit; 2, Cross Section, Illustrating the Manner of Mounting on the Driving Shaft; 3, the Outside of the Wheel, a Plain Disc, the Rim Being Adapted for Any Standard Solid Truck Tire.

A TYPE of wheel which has the appearance of the steel disc units, which it is prophesied will come into general use within a few years on American cars, is that designed by the Cornfield Wheel Co., Inc., Detroit, to what is regarded as a new principal and is claimed to have qualities unlike any other wheel now used on power vehicles.

On each axle is a frame in which eight coil springs are mounted, three above, three below and one each forward and behind, and the hub of the wheel revolves between the springs. The specific action of the assembly is that the load is carried by the upper springs and the recoil of these is absorbed by the lower springs and there is the same effect on the forward and rear springs either from starting or braking.

The wheel may be described as having two series of parts, turning and stationary, the former including the tires, wheel discs, bearings, the inside race, and the drive is through the universal joint, which is connected with the drive flange and the discs are connected with the in-

side race. All these turn with the shaft. The stationary series includes the outer race, the spider block springs, spring bolts, spring plates and spring bridge, which always remain at right angles.

The claim is made for this wheel that although equipped with solid tires, the spring action gives substantially the effect of a pneumatic tire, but is better in that the absorption of all shocks is practically complete, as there is afforded a compensation of both compression and recoil, or substantially a snubbing effect. Other claims made for this type of wheel construction is that it affords surer traction, braking is easier and safer, and the shock absorption is such that the tire is fully protected and will not rupture at the union of the tread and base, and that the wear due to road abrasion is restricted to a minimum.

The construction of the wheel is such and the factor of safety so large there is no possibility of the springs breaking. The carrying capacity of the springs for a given load is 100 per cent. greater than capacity of the main frame springs.

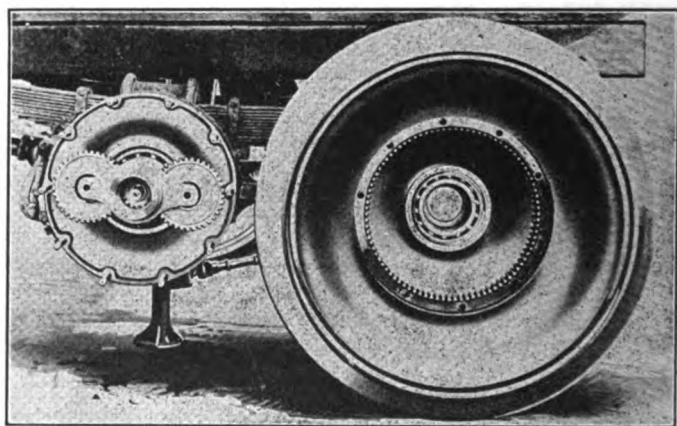
EDWARDS INTERNAL GEAR DRIVE AXLE.

A type of axle which has never before been offered for sale in the automotive industry, yet has been in use for years and tested in service covering approximately 12 years, is what is known as a "balance gear" driven axle, designed and perfected by the Edwards Valve and Manufacturing Co., Chicago. This is an adaptation of a model which has been in use on the Walker electric trucks, made by the Walker Vehicle Co., Chicago.

As will be seen from the illustration, the axle housing encloses the axle shafts, which are driven by a differential gear-set and driving pinion, and on the ends of the shafts are pinions that mesh with two intermediate gears, one forward and the other back of the shaft, and these gears in turn mesh with an internal gear that is bolted to the wheel.

Numerous claims are made in favor of

this type of construction, among them that it is practically noiseless, as the gears are all enclosed in oil tight compartments and all bearings and gears are completely submerged in lubricant. As the reduction is mainly outside of the differential gearset the action of the differential is minimized when driving through sand or on a muddy surface, and yet it is adequate when turning corners. The driving mechanism is self-contained and is easily accessible for inspection or repairs. It is to be made in sizes suited for from one ton to 10 ton trucks.



The Edwards Internal Gear Driven Rear Axle with the Outer Wheel Disc Removed to Show the Axle Pinion, Idler Gears and Ring Gear, All Enclosed in a Steel Wheel.

Crossing the Continent by Army Trucks

Difficulties Overcome in the Mountain and Desert Regions of the Great West

THE accompanying sketches give an idea of some of the difficulties which had to be overcome in the western desert and Rocky Mountain regions by the Motor Transport Corps of the United States army in its recent transcontinental tour from Washington, D. C., to San Francisco, Cal.

This tour was undertaken partly as an educational "stunt" for the benefit of the motor transport branch of the army partly to test the utility of the modern army truck in negotiating any roads that might be encountered and meeting any conditions that might arise should emergency call for such transportation, but the primary object was to interest men in and recruit them for the Motor Transport Corps.

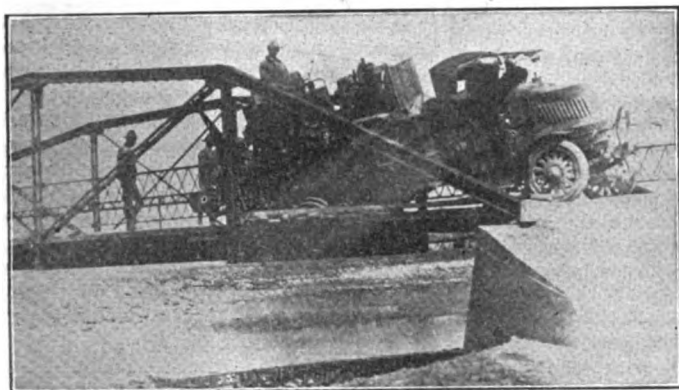
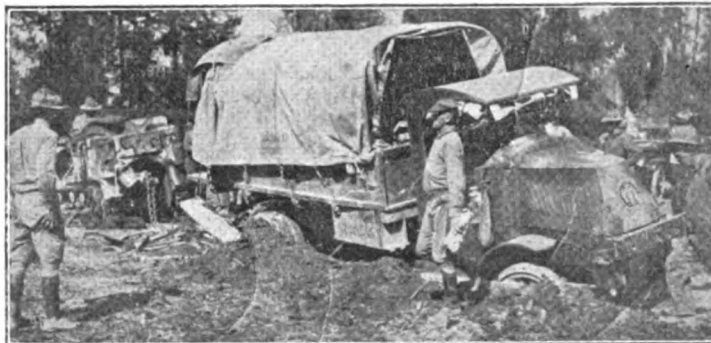
Liberty three-ton trucks, three four-ton Rikers, two 1½-ton Packards, two 1½-ton Whites, two 1½-ton Garfords, two three-ton F-W D's, an Ordnance, four-wheel driven tractor, GMC ambulances and Cadillac, Dodge and White touring cars, with motorcycles as scouts.

The mileage, as taken from the odo-

to imagine how they could be worse.

The weakness of the construction of the ordinary road bridges and culverts and their inadequacy to sustain the weight of the heavily loaded transports was graphically shown at many points along the route as they frequently collapsed under the unwonted strains, but in no case was a vehicle seriously damaged by these mishaps, and they were usually driven away under their own power, after the bridge had been repaired so that the rest of the train might cross. As an illustration of one day's casualties in this line, it may be cited that 16 bridges and 31 culverts were broken between Green River and Fort Bridger, Wyo.

Deep sand and ruts which were almost chasms were



Showing Difficulties Overcome in Recent Transcontinental Tour of United States Motor Transport Corps—Above, Trucks Sunk in the Sand in the Park Near Salt Lake City; Below at Left, Rear Wheels of Truck, Hauling Ordnance Tractor, Crashed Through Bridge Near Fort Bridger, Wyo.; at Right, Finding a Road in Some of the Desert Stretches Was a Matter of Luck and Entailed Much Hard Work with Shovel and Pick.

This tour lasted two months and it is doubtful if as much practical experience and information in motor truck transportation could be gained in years of ordinary service. The commanding officer was Lieutenant-Colonel McClure, a veteran of the European war, and the transport train consisted of five Mack AC 5½-ton trucks, the heaviest vehicles of all, which were used by the detachment of the Engineers' Corps, standardized

meter record, was 3425 in the 56 days of travel, this being an average of 61 1/6 miles a day, and the maximum day's mileage was 87. The convoy followed the Lincoln Highway so far as possible, but occasional detours were necessary. From Washington to Omaha and from the California state line west the roads were generally good, but between these two sections they were bad; in fact in some sections it was reported that it was hard

also encountered and overcome and the machines frequently displayed their success at negotiating open country over which there was no sign of a trail. It is in fact a summary of the wonderful endurance and utility of motor trucks in transporting heavy loads under the most varied and exacting conditions to state that the entire train arrived in San Francisco in condition to continue on indefinitely.

"STABILITY SERVICE."

"Stability Service," published by the Stability Motors Co., Philadelphia, an automobile distributing and service company, is welcomed to the ranks of snappy house organs which are so characteristic of the automotive industry. It purports to be a newspaper for the owner and driver of passenger cars and trucks, and to be issued in the interests of good

transportation, the longevity of motors and the furtherance of Stability complete service. The initial number would seem to indicate that the editors have kept this standard in mind.

HAS OPENED LOS ANGELES OFFICE.

The Roller-Smith Co., 233 Broadway, New York City, announces that its California representative, the Electrical Ma-

terial Co., 539 Howard street, San Francisco, has opened a Los Angeles branch in the Title Insurance building. This will be in charge of E. H. Bell, who has had extensive experience in the marketing of electrical products.

The Electrical Material Co. handles the Roller-Smith lines of electrical measuring instruments, watt-hour meters and circuit breakers, in the states of California, Nevada, Oregon and Idaho.

Automotive Engineers the Guests of the Goodyear Co. at Akron, Ohio

DETROIT and Cleveland sections of the Society of Automotive Engineers recently held a two-day session at Akron, O., as the guests of the Goodyear Tire & Rubber Co. The meetings were devoted principally to the presentation of technical information relating to the use of pneumatic tires on motor trucks, the Goodyear experts having collected valuable data of the company's development of this subject.

The visitors witnessed a demonstration of a new idea in truck design—the tandem axle construction—the Goodyear company's contribution to the truck industry.

The first evening of the visiting engineers were the guests of the company at a banquet, at which President F. A. Seiberling and P. W. Litchfield, factory manager, spoke, the former giving his opinion that within three years the solid tire will be obsolete, the fabric will soon pass, but the pneumatic cord will be the ultimate tire. He also asserted that in a few years there will not be a highway in the country of less than 18 feet in width and that they will be of solid foundation to withstand wear and permit trucks to be operated at high speed.

Mr. Litchfield predicted that the trolley car will be succeeded by the motor bus. Street traffic conditions will soon become such that the entire width of thoroughfares must be utilized and traffic be continuous, with the use of such motor vehicles as can go up to the curb to take on and discharge loads without the interruption of other traffic. If the trolley cars remained, he stated that they would have to go underground as in London.

The festivities included tours of the Goodyear plant, athletic sports in the company's gymnasium and a balloon flight with Ralph H. Upson, the Goodyear aeronautical expert.

The Goodyear committee in charge

consisted of C. R. Johnson, C. M. McCreery, J. E. Hall, W. S. Wolfe and E. R. Preston.

A FEW RESOLUTIONS.

As this is the open season for good resolutions the following are a few suggestions for consideration to owners and prospective owners of motor cars:

Resolved.

To buy a motor car.
Not to kick at every little thing.
To banish all imaginary motor troubles
To drive with care and caution.
Not to drive on flat tires.
Not to kick at service stations.
Not to forget grease in rear axle.
Not to drive with foot on clutch.
Not to forget that radiator needs water.
To give storage battery more attention.
Not to drive with one headlight.
Not to make turns on two wheels.
To buy not to trade.
To give the motor oil.
To remember that others have some rights on the roads.
To keep away from the center of the roads.
Not to jam the brakes.
Not to use porous tires.
Not to expect free service.
To pay a fair price for repairs without kicking.
To remember that perhaps the designer knows more about my car than myself.
That all dealers are not to be classed as "second-story workers."
To carry a few extra.
To inspect my steering knuckles occasionally.

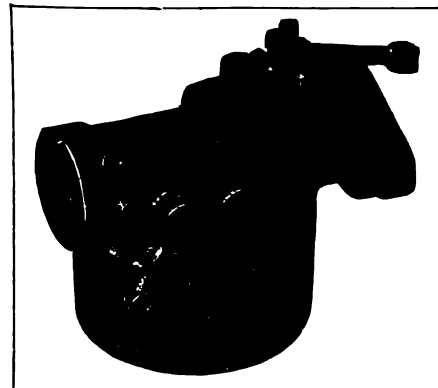
NEW \$1,000,000 FACTORY.

The Chandler Motor Car Co., Cleveland, O., has under construction an 80 per cent. factory increase, the additional floor space totaling 300,000 square feet. The new buildings will cost approximately \$1,000,000.

The Mechanical Memory Systems Co. has been organized, with offices at Aurora, Ill., for the purpose of making a visible control system for the executive's desk, showing schedule of work.

NEVERFAIL CARBURETOR.

The Neverfail Carburetor Co., Long Island City, N. Y., has brought out a new carburetor, known as the Neverfail, which is constructed on the principle of a perfect vacuum at all speeds. There are incorporated in the construction no springs, no air valves, no venturi tubes; in fact, no moving parts of any kind except the throttle and the float. The fuel bowl works on a hinge and is designed



The Neverfail Carburetor.

to be easily detachable without the necessity of removing the component from the car.

The Neverfail carburetor is made in various sizes for all makes of passenger cars, motor trucks and tractors, and a special model for Fords is also to be sold through jobbers and distributors.

The officers of the Neverfail company are as follows: President, J. Herbert Ballantine; vice president and general manager, John H. Ballentine; treasurer, J. Bayard Kirkpatrick; vice president and engineer, B. Volkmar; secretary, S. Asch.

The company maintains branches in Detroit and Los Angeles, Cal. The factory address is 192-200 Jackson avenue, Long Island City, N. Y.

WEINHARDT JOINS SUPREME MOTORS STAFF.

Robert A. Weinhardt, an automotive engineer of national reputation, has joined the representative organization the Supreme Motors Co., Warren, O., is gathering together.

Mr. Weinhardt was formerly connected with the Continental Motors Co., and is the third of that company's staff to join the Warren Corporation, the others being A. H. Zimmerman, formerly secretary-treasurer of the Continental, who now is vice president and general manager of the Supreme Corporation, and V. M. Smith, superintendent of the Supreme Corporation, who held a similar position with the Continental.

Mr. Weinhardt began his automotive career in 1906 when he became designing engineer for the Nevada Motor Car Co., Chicago, which manufactured desert transports. Mr. Weinhardt designed a disc wheel during his association with the Nevada company to meet conditions encountered in sandy and arid regions. This type of wheel has now become popular on many lines of automobiles.



The Joint Conference of the S. A. E. Members of the Detroit and Cleveland Sections at the Goodyear Factory at Akron, O.

Willys Corporation Increases Personnel

The Willys Corporation, Toledo, O., has made the following additions to its personnel, following its recent election of officers: Jay V. Hall, vice president in charge of motor car production, will have complete oversight of the production of the new light six-cylinder car. Mr. Hall was formerly sales manager and a member of the executive committee of the Olds Motor Works, a General Motors unit. He will be assisted by D. F. Edwards who, for two years, was assistant to the president of the General Motors Co.

D. S. Devor, for many years works manager of the Olds Motor Works, has been appointed manager of the Willys corporation's Elizabeth, N. J., plant. Frank H. Schuman, until recently superintendent of the motor plant of the Buick Motor Car Co., has been named assistant works manager. F. Sergardi is chief engineer of the Elizabeth plant, being formerly identified with the F. I. A. T. Motor Co., Turin, Italy.

P. L. Battey, formerly vice president and general manager of Price & Co., Chicago, recently a consulting engineer of the Willys-Overland Co., is in complete charge of all plant engineering and construction work.

Robert E. Naylor, formerly superintendent of the gear department of the Hudson Motor Car Co., has a similar position with the Willys organization. A. R. Kelso, formerly chief tool designer of the Hudson Six Co., is at the head of the tool designing department.

A. D. Kinsey, formerly works manager of the Racine Manufacturing Co., Racine, Wis., will be in charge of sheet metal work and stampings.

M. W. H. Wilson, formerly assistant to the general works manager of the Cadillac Motor Car Co., Detroit, becomes superintendent of maintenance and equipment.

Robert C. Henes, until recently assistant superintendent of the pressed and sheet metal department of Dodge Brothers, Detroit, has been selected as superintendent of the same department with Willys.

The management of the Electric Auto-Lite division of the Willys corporation, operating plants at Toledo, O., and Poughkeepsie, N. Y., will continue under the direction of C. O. Mininger and his associates.

REMY ELECTRIC OCCUPYING NEW FACTORY.

The Remy Electric Co is now occupying its new daylight factory at Anderson, Ind. This building is 50 feet wide, 350 feet long and five stories high, with basement under all. The offices occupy 75 feet at the front of the first four floors and the fifth floor is occupied by offices and the drafting room. To relieve the housing problem at Anderson the Remy company has leased an entire hotel in that city to be occupied solely by male employees.

RAWSON-UPSHAW CO. FORMED.

A new firm, the Rawson-Upshaw Co., opened for business on Jan. 1 at 310-314 Marietta street, Atlanta, Ga., for engag-

of 1910. He started his business career in 1902 in a wholesale hardware house in Birmingham, Ala. His first connection with the Elyea-Austell company was as a traveling salesman, and he was later



William A. Rawson, President, Rawson-Upshaw Co., Atlanta, Ga.



E. N. Upshaw, Vice President and Treasurer, Rawson-Upshaw Co.

ing in an exclusively wholesale business in automotive equipment, bicycles and supplies. The president of the new concern is William A. Rawson, who has been connected with the Elyea company of Atlanta for the past four years as active head of the bicycle department.

E. N. Upshaw, who is vice president and treasurer, has been associated with the Elyea company since the early part

made department manager. At the time of his joining the Rawson-Upshaw company he was sales manager and secretary of the corporation.

The Rawson-Upshaw company will operate along well recognized jobbing lines and as they have ample capital and are well known and popular in the section in which they are to be represented, a successful future may be predicted.

ARKAY SALES COMPANY OPENS.

The Arkay Sales Co., handling automotive equipment, announces its opening at 5 Columbus circle, New York City. Harry Ruben, formerly sales manager of the Warner Lenz Sales Co. of New York and recently of the Republic Auto Parts Co., and William Kandel, formerly of the Warner Lenz Co. of Chicago, are the co-partners in the Arkay Co.

The Arkay Sales Co. was organized originally in 1917, but decided to discontinue business on the outbreak of the war, as both Mr. Ruben and Mr. Kandel were called to the colors, serving overseas with the 77th and 81st divisions respectively.

ESSEX WILL DOUBLE PRODUCTION.

Essex Motors, Detroit, has just shipped the 20,000th Essex car from the factory, this event marking the completion of the Essex production programme scheduled for 1919. Less than a year ago the lines on which these cars were to be assembled existed only on paper, although the design of the car itself had been perfected and submitted to every conceivable test for more than a year, when production plans were brought to a standstill by war conditions.

When the armistice was signed new equipment had to be purchased and installed and material collected before manufacture could begin. Nevertheless the Essex was in production in December of last year and early in January cars were being shipped to distributors and dealers. Since then the demand has taxed production to the utmost and as a result it is planned to double the number of cars to be made next year, or to turn out 40,000 cars.

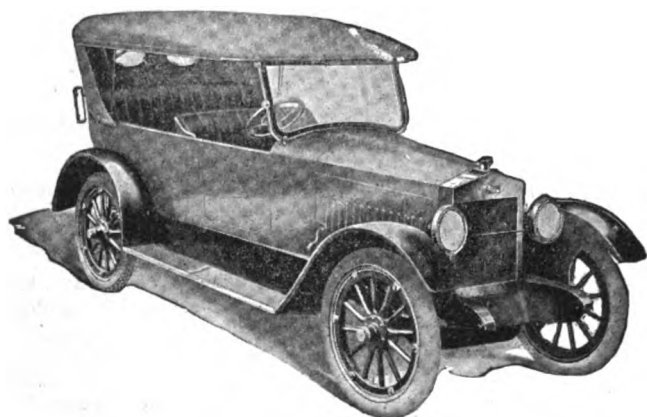
The president of Essex Motors is W. J. McAneeny.



W. J. McAneeny, President, Essex Motors.

New Alsace Export Car Designed Especially for High-Class Foreign Trade

TO ATTEMPT to satisfy the local and domestic market is a problem that constantly faces the motor vehicle manufacturer and one that necessitates constant study of all phases of the situation. How much more difficult then is the situation which faces the American manufacturer of a car which he expects to market and have operate with satisfaction in foreign countries. Then there is to be considered not only the choice of the foreign buyer in the matters of general design and color scheme, but the various operating conditions to be met with, the rules of the road requiring in general the control of the car from the opposite side to that common in America, road clearances, the grade of gasoline possible to secure, the type and design of parts that will give the utmost service in the hands of the average foreign user,



The New Alsace Export Car.

his ability to get parts and renewals, the sort of top material that will withstand alike the rains of the gold coast and the tropic sun of the Sahara, and the matter of designing the car for easy and safe shipment in the smallest possible number of cubic feet.

This problem of the export automobile has been approached by the Automotive Products Corporation, New York, with a complete understanding of the many problems involved and a thorough grasp of American manufacturing methods and processes and the possibilities of achievement in design and equipment, and it now announces the Alsace, a car produced exclusively for export sale. It has collaborated in the design and controls the entire production of this vehicle, which is built entirely from standard American parts, readily obtainable at all major distributing points throughout the globe, and in

its ensemble presents a design which is pleasing to the critical foreign buyer and will render long and efficient service whether on the boulevards of Paris or the veldts of the Transvaal.

This car is to be sold only through large and well established foreign distributors at strategic trade centers, and the fact that advance orders have already been booked for several hundred cars even before the appearance of the descriptive literature, indicates the confidence placed in the organization and equipment of the Automotive Products Corporation, which is an allied corporation of the well known American Steel Export Co.

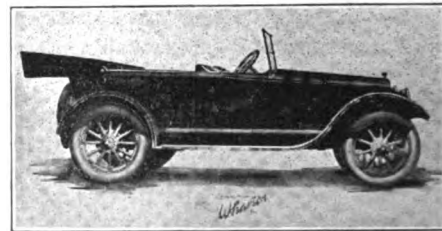
The brief specifications of the Alsace car follow: Motor, Herschel-Spillman, four-cylinder, 3½ by five inch; lubrication, force feed and splash; cooling, thermosyphon; radiator, honeycomb, large area, Rolls-Royce type, nickel silver shell; clutch, Borg & Beck; carburetor, Zenith; transmission, Grant-Lees, selective, three-speed; starting and lighting, Dyneto two-unit; ignition, Bosch magneto, water proof; battery, Philadelphia Diamond Grid six volts, 120 amperes; drive, Hotchkiss; axle, front, Standard Parts, I-beam; rear, Standard Parts full floating; brakes, service and emergency, each 14 by two-inch; wheels, wood artillery type; frame, five-inch, pressed steel; springs, semi-elliptic, front and rear; fenders, 10-inch, full crown; steering, Gemmer irreversible, right side drive; fuel system, Stewart vacuum; windshield, slanting and adjustable; wheelbase, 116 inches; tread, 56 inches; tires, 32 by four-inch, non-skid rear, plain front, Fisk or Goodrich; body, five-passenger, straight line, one-man top, best leatheroid upholstery; finish, radiator shell, nickel silver, fenders, splash pans and shields, black enamel, body, Rolls-Royce blue, deep red or cobalt blue; weight, 2600 pounds; price, \$1485 list, f. o. b. factory, Philadelphia.

Calcutta, India, has more motor cars on its streets than any other kind of vehicle.

are the following: Wheelbase, 90 inches; tread, 36 inches; engine horsepower, 9-13; cylinders, two; bore, 3½; stroke, 3½; cooling, air; ignition, Atwater Kent; tires, Firestone non-skid, 26 by 3; wheels, Dayton wire; lamps, three electric; horn, electric; frame, channel steel; friction drive to chain and sprocket; bearings, Bock, New Departure and bronze throughout; springs, Mather, front and rear; quarter elliptic, chrome-vanadium; finish, enamel, royal navy blue; wheels, light blue.

WHARTON PRACTICAL SIX TO MEET POPULAR DEMAND.

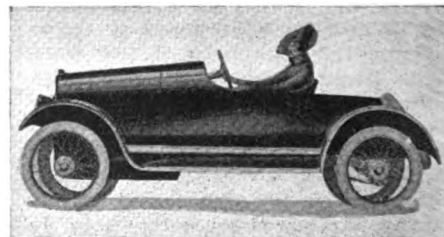
The Texas Truck & Tractor Co., Dallas, Tex., has entered the passenger car field with the Wharton Practical Six, made in five and seven-passenger touring car and four-passenger roadster models, designed to meet the popular de-



Wharton Practical Six.

mand for the streamline effect. The specifications are as follows:

Upholstering, genuine leather stuffed with curled hair, ventilated springs; top, instant oneman, made of Never-Leak material, fitting down over windshield frame in a tight joint; windshield, clear vision, convertible type, outside rails of pressed steel; gasoline tank, capacity 18 gallons, with two-gallon reserve reservoir assembled on rear, Stewart-Warner vacuum system; battery, Willard, six-volt for ignition, lighting and starting; carburetor, latest type Stromberg; fenders, crown type, pressed steel enamel baked; wheelbase, 126 inches; clearance, 11 inches at lowest point; motor, Continental, six-cylinder, cast en bloc, removable cylinder head, 3¼-inch bore by 5¼-inch stroke; starting, two-unit system, automatic release; rear axle, full floating; differential gear and pinion, spiral bevel type; transmission, selective type, three speeds forward and one reverse unit with motor, high quality gears and over-sized bearings; drive, Hotchkiss type; propellor shaft, two universal joint type with extra large joints, grease packed in dirt-proof metal housings; shaft, tubular, 1½ inches diameter; ignition, Atwater Kent, new fool proof type; steering, worm and nut type and irreversible; steering arm and yoke, extra large drop forgings throughout; brakes, two sets, emergency, internal expanding, 11 11/16 by 1¼-inch, and service, external contracting, 12 by 2 inches; springs, semi-elliptic, both front and rear, front 36 inches long and rear 52 inches long, main leaves vanadium steel; wheels, artillery type, 32 by 3¼ inches, 12 spokes to the wheel, best second growth hickory; tires, 33 by four inches, straight side, plain in front, non-skid on rear; weight, 2960 pounds; price, \$1250 f. o. b. factory; wire wheels, \$60 extra.



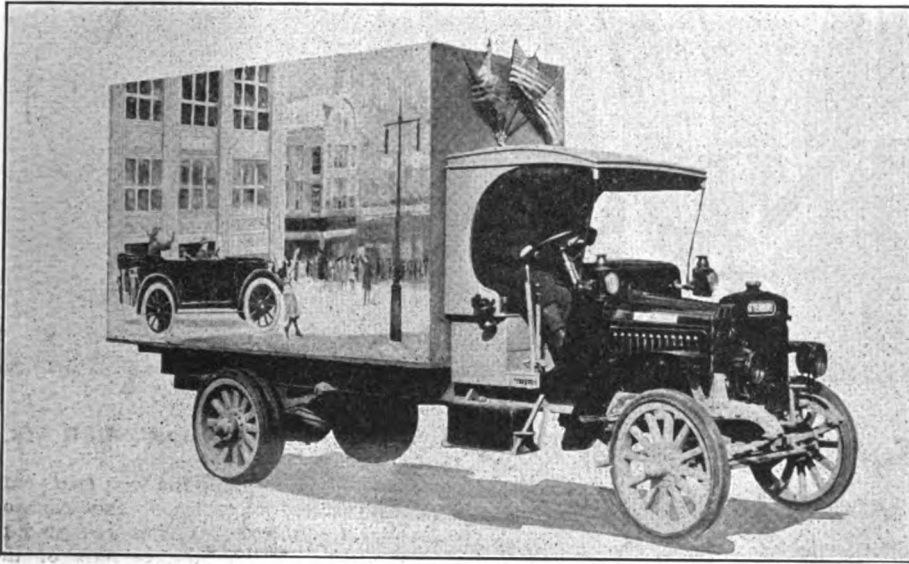
One-Passenger Cyclomobile.

ONE-PASSENGER CYCLOMOBILE.

One of the latest offerings in a low-priced car this season is the Cyclomobile, designed for one passenger only, manufactured by the Cyclomobile Manufacturing Co., Toledo, O., which can be delivered f. o. b. Detroit for \$360.

It is equipped with the Morley patent noiseless, gearless transmission. Five speeds, forward and reverse are provided, with only three controls, brake, gas and clutch. Among the other specifications

Novel Use of Truck in "Cross-at-Crossings" Campaign in Philadelphia



Stability Motors Co., Philadelphia, Assists in "Cross-at-Crossings" Campaign.

THE increasing accidents and fatalities on the streets of every large city today, caused directly or indirectly by carelessness on the part of pedestrians, has caused vigorous campaigns to be started in favor of the "cross-at-crossings" traffic rules, these being chiefly educational in character.

The accompanying illustration shows the method adopted by the Stability Motors company in Philadelphia in trying to impress an object lesson that even the youngest pedestrian could not fail to comprehend. This concern conducts an automobile distributing and service business in the Quaker City, and it arranged a novel body to be fitted on an Atterbury truck chassis consisting of a frame work supporting screens on which were portrayed life like street scenes showing the fatal consequences of disobeying the common sense traffic rule of "crossing at crossings" only.

This truck was driven through the streets of the city where even "those who ran might read," and doubtless was more effective in spreading the desired propaganda than much newspaper publicity and many formal talks or lectures on the subject.

In this connection it may be noted that in New York City a "safety first" campaign is to be inaugurated for the purpose of educating school children in the rules of the road and thereby attempt is to be made to reduce the number of accidents. The first meeting will be held in the Capitol theater on Saturday morning, Jan. 10, at which Police Commissioner Enright will preside, and addresses are to be made by Francis M. Hugo, secretary of state; Dr. W. L. Ettinger, superintendent of the New York City schools, and Dr. Francis Holley of Washington, D. C.

Similar meetings are to be held in other cities of the state, this campaign having originated with Mr. Hugo and, supplemented by appropriate moving pictures and other illustrative features,

could be made highly effective in instilling into the minds of the younger pedestrians who in reality contribute the highest toll to this class of accidents, the necessity of observing traffic rules that are made and enforced for the safety of all concerned.

PUBLISHES LIST OF STOLEN CARS.

The Buffalo, N. Y., Express has inaugurated the plan of publishing daily a complete list of motor cars stolen in that city, including motor numbers and all other identification data given to the police. The officials of the police department state that this aids them in recovering the stolen cars.

PROPORTIONS OF PRESENT-DAY TRACTOR INDUSTRY.

The accompanying illustration, showing the shipping room of the factory of an extensive maker of agricultural tractors, with hundreds of these machines all boxed, will afford some idea of the proportions that this branch of the automotive industry has attained in the central, southwestern and western sections.

The Emerson-Brantingham Co., Rockford, Ill., has been well known for some time as makers of agricultural implements of all kinds, and when the movement for scientific power farming manifested the need for the present day type of agricultural tractor, this concern engaged extensively in the development of a line of machines that have proved highly efficient and popular throughout the fertile grain and cotton belts.

In the consideration of the remarkable growth of this industry it should be borne in mind, however, that this is but one of hundreds of concerns which are engaged in the quantity production of these utilities which are proving themselves one of the most important factors in the expansion of extensive and intensive farming in this country today.

OPERATED AT FULL SPEED.

One of the few Detroit manufacturers who continued to operate full time and at full speed despite the recent electrical power restrictions, was the Hinkley Motors Corporation, which secured its entire power and light supply from a battery of Hinkley heavy duty automotive engines. Although this firm's equipment includes a considerable amount of heavy machinery, no difficulty was experienced in supplying all demands, the entire battery of engines requiring the attention of only one man.



A Section of the Shipping Department at the Emerson-Brantingham Factory, Rockford, Ill., the Crates Containing Tractors Ready for Shipment.



TIRE INDUSTRY AND TRADE

IDEAL TIRE AND RUBBER LETS NEW PLANT CONTRACT.

The Ideal Tire & Rubber Co., through D. C. Hathaway, general sales manager, announces that ground has been broken for a large addition to its present plant. Contracts amounting to \$6,250,000 are already on hand, and it has become imperative that this new unit be

rushed to completion. The Ideal plant is now running three eight-hour shifts and employs about 450 men.

"Our present splendidly appointed factory with modern equipment and floor space of about 65,000 feet," said Mr.

Hathaway, "is now turning out approximately 1000 tires and 800 tubes per day. We have on contract for the coming year 18 large distributors, in addition to having a wide distribution of dealers, making it necessary to increase our production capacity to at least 2000 hand made tires per day.

"As a step toward service to our distributors and dealers, we have recently perfected the Greyhound cord tire, into which has been built all the efficiency, quality and skill that have earned for the Greyhound fabric tires their great popularity. The Greyhound cord tire with its new tread designed to skillfully hold the road, is a marvel in super size and



Some Features of Firestone Co. Activities

Following are some of the outstanding features of Firestone activities announced at the recent annual meeting of the Firestone Tire & Rubber Co., Akron, O.:

Resources exceed \$73,000,000; employees number 17,000; sales last year were over \$91,000,000; is using approximately 10 per cent. of world's present production of rubber; is making 23,000 tires and 27,000 tubes daily; added equipment now ordered and to be put into operation early in 1920 will raise output of Plants Nos. 1 and 2 to 36,000 tires and 40,000 tubes daily.

Firestone makes rims for over half the manufacturers of passenger cars and trucks; has 62 direct factory branches and more than 46,000 dealers throughout the United States, and 118 foreign branches and distributors who in turn serve thousands of dealers.

Firestone is among the first of American manufacturers with a rubber mill in Singapore, Straits Settlements, the world's headquarters for crude rubber.

WILLIAMS FOUNDRY'S OFFICERS.

At the recent annual meeting of the Williams Foundry & Machine Co., Akron, O., maker of vulcanizers and tire repair machinery, the following officers were elected:

President, F. E. Holcomb; vice president, S. F. Ziliox; treasurer, G. Carl Dietz; secretary and assistant treasurer, William J. Slater; additional directors, Charles Reyman, Charles Herberich, A. W. Burnett.

UNIQUE FORM OF ANNOUNCEMENT.

The American Tire & Rubber Co., Akron, O., announced the completion of its \$100,000 factory addition by giving a Christmas party to its employees, dealers and distributors and their families. Other expansion plans include the erection of a power plant. A new hydro-electric plant, which produces all the electricity for lighting the building and a huge electric sign, is also open for inspection.

ORGANIZES MALAY RUBBER CO.

Owen Moynihan, for the past two years general sales manager of the Amazon Rubber Co., Akron, O., has resigned to assume the active management of the



Owen Moynihan, General Sales Manager, Malay Rubber Co.

newly formed Malay Rubber Co. This concern has been organized by distributors and dealers in all parts of the country for the purpose of manufacturing and merchandising high grade tires.

Mr. Moynihan, before his connection with the Amazon Co., was eastern district representative of two of the Akron rubber companies, and before that time he was in the offices of distributors. His wide experience in this field eminently fits him for his new position as general manager of the Malay Rubber Co., in which he will have associated with him tire experts to have the oversight of every phase of manufacture, sales and advertising.

The Malay Rubber Co. will build a complete new plant in Cleveland, O., where a diversified labor market and ideal transportation and living conditions will assist in keeping down production costs. Executive offices have been opened at 1035 Guardian building, Cleveland.

Fairbanks Likes Good-year Cord Tires

The Goodyear Tire & Rubber Co. announces that Douglas Fairbanks has ordered the first set of Goodyear cord tires to be built at the California plant of the company. "Doug" wrote a letter to F. A. Seiberling, president of the Goodyear company, congratulating him on his selection of California as the location of the



new factory. "Your foresight and industrial vision and the commanding position your company holds in the business world," he wrote, "have a tremendous influence upon the prosperity and development of this part of our country, which we all love so much."

The Firestone Tire & Rubber Co., Akron, O., has broken ground for a mechanical building on a site south of plant No. 2. This will be three stories high and is designed to accommodate the electrical, machine, pipe, carpenter, pattern and tin shops, and will coordinate under one roof all the labor of this nature which has heretofore been done in the various buildings of the factory. It will have a frontage of 325 feet on Main street and a depth of 315 feet. Approximately 80 per cent. of the walls will be glass. The floor will be of wooden blocks laid on reinforced concrete. The cost of construction will exceed \$400,000.

The B. F. Goodrich Rubber Co., Akron, O., on Dec. 1, paid to nearly 5000 salaried employees a bonus of 25 per cent. of their annual salary. The total amount paid extra this year was about \$2,500,000.

The Interstate Auto and Repair Co., Norfolk, Va., has secured the agency for Racine tires, made by the Racine Rubber Co., Racine, Wis.

The Perfection Tire & Rubber Co. has made arrangements to increase the output of its plant at Fort Madison, Ia., to reach a daily production of 5000 tires.

LEE COMPANY TO PUSH EXPANSION.

By the recent sale of 40,000 shares of new stock, the Lee Tire & Rubber Co., New York City, secured \$1,200,000 additional working capital with which to carry out production expansion plans. At the present time the Lee company has been turning out 1500 tires daily, but the proposed schedule calls for an increase to 2500 by Feb. 1, and at the end of 1920 it is planned to bring the production up to a daily output of between 4000 and 5000 tires.

For the current year the gross output is expected to reach \$8,000,000, with a net profit sufficient to pay between \$5 and \$6 a share on the 100,000 shares outstanding. In addition to the 40,000 shares recently subscribed the Lee company is issuing 10,000 shares for subscription by its employees on a partial payment plan. It is expected that the gross earnings for the coming fiscal year will reach \$12,000,000, which will provide, after tax payments, for a dividend of between \$7 and \$8 a share on the 150,000 shares.

MASON SALES SHOW INCREASE.

The Mason Tire & Rubber Co., Kent, O., reports that its sales for its third fiscal year, ending Oct. 31, 1919, amounted to \$3,468,858.52, with a net profit of \$223,705.52. This is an increase of about 50 per cent. over the preceding year. During the last few months the company has opened 10 additional direct factory branches in the United States, making a total of 18. The Mason goal for 1920 is \$7,000,000 worth of sales.

STERLING CO. ADVANCES PRICE.

The Sterling Tire Corporation, Rutherford, N. J., announces an advance in the price of Sterling tires and tubes from 10 to 20 per cent., this being made necessary on account of the increase in the cost of fabric and cord during 1919 from \$1 to \$2 a pound, and also the increase in wages.

Savold Tires Make Electrical Display

Standing above the noise and rush of Columbus circle, New York City, is the spectacular electrical display of Savold tires, the story of which is flashed by invisible mechanism through the medium of 4800 electric lights.

Columbus circle is the world's busiest traffic point. More motor cars pass there than any other spot known, the average being 3921 cars an hour. Automobile row, known all over the United States, cuts through the heart of Columbus circle and the eastern tire business radiates from there. Every rubber company and every automobile concern of consequence is represented here, and the exporting influence is carried away to every corner of the globe.

The structure on which the Savold display is supported is 48 feet high and 95 feet long, which is equal to building four stories high. Ten workmen were employed constantly for two months in the construction of the steel frame. It faces head on and can be seen all the way down Broadway and down Eighth avenue. It was designed and executed by the O. J. Gude Co., the originators of the Great White Way, and the Savold tire display is a fitting component to this vast electrical show of the Metropolis. It is estimated that this advertisement is noted daily by more than 325,000 visitors who pass through Columbus circle.

The St. Louis Tire Dealers' Association has been organized with these officers: President, Joseph Roberts; vice president, Maurice Altheimer; treasurer, E. G. Hefter; secretary, Robert E. Lee; sergeant-at-arms, Arthur Fishell; directors, Joseph Sacks, Art B. Mooney, I. Reifer and J. P. Hartmann. Dues will be \$25 annually for active members and \$15 for tire manufacturers represented at St. Louis, who may be associate members. There are approximately 125 tire dealers in the city.



Electrical Display of Savold Tires in Columbus Circle, New York City.

Buffalo Tire Company Is Prosperous

The Madison Tire & Rubber Co., Inc., with factory at Buffalo, N. Y., executive office at 30 East 42nd street and general sales and advertising office at 254 West 57th street, New York City, is one of the newer concerns to engage in the tire industry, having been incorporated in May, 1919, and having commenced the actual production of tires the following August. Its plant at Buffalo is so located as to have the facilities of two railroads with sidings in its own yards. Power is supplied by the hydro-electric service from Niagara Falls, which is not dependent on or interrupted by coal shortage. The plant is stated to be valued at over \$1,300,000. The company has issued \$2,000,000 in preferred stock and there are, outstanding, 86,600 shares of common stock. Officials of the company state the total present assets to be about \$4,000,000. The product consists of the Madison brand of automobile tires and inner tubes, manufactured by the hand-made process. The line includes both cord and fabric tires with ribbed and non-skid tread, clincher and straight-side pneumatics, and red and gray inner tubes. The manufacturing facilities are sufficient to jump the production on demand to 1200 tires and 2000 inner tubes a day. All the product is fully guaranteed. The president and founder of the Madison Co. is Rudolph A. Low, who has been in the rubber business since 1880. He is a member of the Merchants' Association of New York, the Russian-American Chamber of Commerce, the United States Chamber of Commerce, the National Association of Manufacturers, the Associated Manufacturers and Merchants, the Automobile Club of America, and many of the better known social organizations. Mr. Low has associated with him the following capable officers and executive heads, all of wide experience in the industry: Max Lowenthal as treasurer; Theodore W. Bassett, vice president; Clarence H. Low, secretary; A. E. Tallmer, assistant treasurer; Dr. Louis J. Plumb, A. M., B. S. (Princeton 1904), chief chemist; Frank H. Brewster, vice president and general superintendent; Williams Myers, superintendent of production; Jean Nehmelman, head of sales department; H. Tyler Kay, in charge of advertising and sales promotion, the publicity being handled, under

Mr. Kay's direction, by the Sacks Co., of which C. O. Sacks is president. The general sales policy for the present is to give the exclusive sales rights to one retail tire dealer in each city or defined territory.

The Pennsylvania Rubber Co., Jeannette, Pa., has declared a quarterly dividend of 1½ per cent. on preferred stock and 1½ per cent. on common, payable Dec. 30 to stockholders of record Dec. 15. This company, which makes the well known Vacuum Cup tires, has been one of the first of the larger manufacturing concerns of the country to take up and advance the "Homes for Workmen" movement. To the south of Jeannette, where the company's big factories are located, it purchased approximately 200 acres of land and called in a corps of expert town planners and architects to develop a model town wherein its workmen might, on easy payments, acquire their own homes. The original plan called for 12 houses, but these were taken with such eagerness that a contract was immediately let for 50 more, with an ultimate goal of 1600 homes. These are up-to-the-minute six and seven-roomed houses, finished in stucco, brick and frame, and containing every modern convenience. The town plan arrangement is being applied to the entire plot, and will include graded and improved streets, a public square, recreation park and community center.

The B. F. Goodrich Rubber Co., Akron, O., is to broaden the scope of its National Touring Bureau, to include the dissemination and distribution of all highway transport data, and has changed its name to the Goodrich Travel and Transport Bureau, and will adhere strictly to the policy of the promotion of highway transportation service and to co-operate with all forms of transportation by land, water and air, in obtaining a more extended and efficient use of their respective facilities. Through its country wide organization of branches, depots and dealers, the bureau has distributed more than 150,000,000 pieces of touring information to the motoring public, this including nearly 5,000,000 road maps, during 1919. Raymond Beck, who acted as field engineer of the United States transport committee during the war, has been chief of the bureau since its inception in 1911, and among the highway transportation experts on the advisory board are Robert C. Hargreaves, formerly secretary of the Highway Transport



Rudolph A. Low, President, Madison Tire & Rubber Co.

Committee, and S. V. Norton, Goodrich truck tire sales manager.

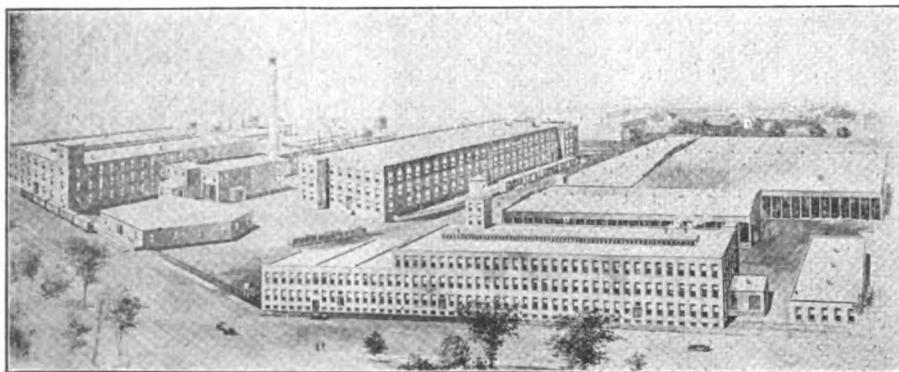
The Kelley Tire and Rubber Co. has completed plans for the expenditure of approximately \$650,000 in West Haven, Conn. The company has bought five acres of land as a site for a new plant. Edward J. Kelley of New Haven is president of the company. He was formerly a railroad official. Charles H. Bortell, Jr., is vice president and treasurer. The company, which is being financed entirely in Connecticut, is capitalized at \$1,000,000. It is planned to make 500 cord tires and 1000 tubes daily at the start.

The Stanwood Rubber Co. announces that it has acquired all the capital stock of the Hardman Rubber Corporation of New Brunswick. The Hardman plant, which is being continued under its trade name, was established more than 20 years ago, but is operated under the direction and supervision of the Stanwood company. Lorne A. Scott, former president of the Hardman Rubber Corporation, has been succeeded by William Mackay, president of the Mutual Tire & Rubber Co., who assumes the duties of heading both companies.

The Portage Rubber Co., Akron, O., is to pay on Jan. 1 a quarterly dividend of 1½ per cent. on preferred stock outstanding and of record Dec. 20, 1919.

The Marion Tire & Rubber Co., Marion, O., has turned over its plant to a corporation which recently purchased it, headed by Ray C. Ellsworth of Akron, O. The capital will be increased from \$300,000 to \$750,000 and it is also planned to enlarge the plant.

A \$300,000 building which is to be erected on Winthrop street, Hartford, Conn., by Louis White, will be occupied when completed, on long-lease terms, by the Connecticut branch of the Goodyear Tire & Rubber Co., Akron, O. This will give the branch much needed space for expansion of its business. The new building will be four stories high, of concrete and steel construction, the tentative measurements being 70 by 160 feet.



Extensive Plant of Madison Tire & Rubber Co. at Buffalo, N. Y.

Up-to-Date Methods of Vulcanization and Tire and Tube Suggestions

Compiled by the Goodyear Tire & Rubber Co.

A RECENT 6000 mile inspection tour in the interest of vulcanizers, revealed the surprising fact that a large percentage of those who are having trouble with vulcanizing work, with equipment and with repair materials, feel that, regardless of how they handle repair materials and equipment, good results can be and should be obtained.

Now the day of the unskilled repairman has gone. He is rapidly being replaced by the tire surgeon, skilled in his work and rigidly adhering to certain fundamental laws which underlie it. Like the medical surgeon who operates upon a patient, carefully observing all natural physical laws and governing his work by the best accepted practise, the tire surgeon must conform his work to certain natural laws. He must not substitute haphazard methods if he expects success as a vulcanizer and repairman. He dare not ignore the methods of using repair and vulcanizing materials which costly experiments and careful study have proven.

On this trip a repairman who had asked that an expert be sent to his rescue was visited. This man was having serious trouble, although he had had long experience in the business. It was found that he had raised the steam pressure contrary to specifications, so that a cracking of tread material resulted. When questioned about this he replied: "Oh, I know 40 pounds of steam is specified for this cure, but it takes too long. Sixty pounds let's me get out more work. In this way I shorten the time of curing." Expert advice had been disregarded and yet good results were expected.

Another vulcanizer was visited. This man had had special training and had been taught to cut his fabric on the bias, had been given the reasons for doing so and had been assured that excellent results might be expected from this method. Nevertheless, he was found cutting the fabric straight.

These are only examples of conditions found to be widely prevalent. In some cases lack of knowledge of tire repairing was the trouble. In others it was the disregard for established rules which had been taught. Now a man working a problem in addition would not expect to get the correct results if he applied the rule for multiplication. The same principle holds in repair and vulcanizing work. Certain things are known absolutely to be true. It is the interest of the tire repair man—tire surgeon—to get behind a movement, thus increasing the confidence of the tire using public, that will result in better tire repairing.

It is a good plan to give this idea two or three months trial for comparison with past records. Make the repair shop something pleasing to the customer both in appearance and workmanship. Devise a systematic way in which to carry

on repair and vulcanizing work. Check up shop leakage.

One repair shop visited was a very large one; its proprietor was a busy man who operated a large service station and an accessory store in connection with the repair shop. The repair department was left entirely to the foreman; the owner seldom visited the work room. While going through this room a small box of uncured trimmings was noticed. The box contained a mixed collection of black, white and gray tread gum, cushion gum, building fabric, dust and dirt, together with dried cement. Two full barrels of this same collection was found, practically valueless. It probably weighed 400 pounds in all. This material, had it been kept free, separated and clean, was worth approximately \$200. As it stood \$30 would have been a good price. There was, therefore, a waste of \$170. This is but an example of many similar kinds of leakage noticed.

If the vulcanizer expects to get the results and profit that are rightfully his, it is absolutely imperative to check up on these things.

Method of Mending Large Hole.

A practical method of putting fabric in a section where there is a very large hole or where there is nothing much left but the beads, is to cement the iron core and stitch a ply of fabric down to it. Set the tire over it, stick the beads fast to the core in the usual position. This gives a natural foundation on which to build up the section in the ordinary manner. All the chafed and dirty fabric should be trimmed off around the beads. With this method the correct size and shape of the casing may be maintained.

A few weeks ago in visiting a repair shop, the operation of preparing a casing for a retread was carefully noticed. The old tread was worn, loose and badly cut up. The repair man skinned the old tread off, buffed the carcass and cemented it.

Now several places were noticed where water and dirt had soaked into the fabric. When buffed the old fabric was white and lifeless and rotten. These places, if not watched, will develop separation or loose spots. It is a much better practise to step out a patch at this point and replace it with a clean, new piece of material. In taking this precaution many tread separations will be prevented.

A section was cut down, the casing buffed and then washed, the rag was very heavily loaded with solvent and the old material and fabric was heavily saturated. After allowing it to stand a very few minutes, cement was applied. As a result a very porous condition developed in the cure, as the solvent had not entirely evaporated. In washing casings, merely use a slightly moistened rag to clean out dust and dirt.

Breaker Strip Loosened.

In making a cure on a sectional retread job a Texas repair man found that the old breaker strip, apparently sound and good, would come loose, spoiling the job. He inquired what might be the cause of the difficulty. There are several possibilities, one is that tread cuts when left to care for themselves, permit water to soak into the carcass and destroy the texture of the breaker. Cement conditions not thoroughly dry or oil in solvents will also loosen the breaker.

Trouble with Air Bags.

A great deal of the trouble experienced in handling air bags is due to improper application for the most part. In handling old stretched casings and poorly fitting bags, the repair man should take care to pad the air bag to fit the casing. The reason for this is that air bags should spread the beads of the casing three-quarters of an inch before it is properly fitted. The bead molds are then applied and the clamp screw turned until the cavity mold fits snugly to the walls of the casing. Then the air bags should be inflated five pounds and the clamp screw given a three-quarter turn. Now inflate the bag to the proper pressure. Be sure that the air bags are centered in the molds so that only the heavy ends protrude beyond the ends of the cavity.

Get Pure Solvents.

Solvents continue to give vulcanizers as much difficulty as any one thing in the process of repairing. Most of the faulty curing is due to impure solvents. Care should be taken to obtain the purest sort of solvent on the market free from all traces of oil. In washing stock and thinning cement, traces of oil do damage that makes a perfect job impossible.

Answers to Queries.

A western repair man asks this question: "Should one or two plies of cord be left when a blowout is being repaired?"

Cords in the cord tire are laid in groups and must be removed as such. For instance, remove the two sets of plies as follows: Inside first, then the outside group. This will allow replacement.

A repairman from Salt Lake City asks how many plies of cord there are in cord tires. A 3½-inch tire has four plies; a four-inch six plies; a 4½-inch tire six plies, and a five-inch tire eight plies.

Vulcanizers often ask the question: "How can I tell if the job I finish is cured, under-cured or over-cured?" When a tire is overcured it is very hard and firm and if tried with a pencil, gouges out in small chunks, while if the job is under-cured, the pencil jabs will remain and show as dents in the rubber. If properly cured the tire will not show where the pencil jabs were made and will cure with a fine "bloom."

ACCESSORIES DEPARTMENT

Union Tool Chests are made for a discriminating service station trade that requires the best. The frame is made from thoroughly kiln-dried oak, all joints lock-cornered, with the top of cover and bottom of chest rabbited in, glued and nailed. The trays are automatically raised or lowered by special hinged fittings, are provided with removable partitions and are constructed with all joints rabbited and glued. When closed the tray fits flush with top of chest, holding the contents in place when the cover is closed.



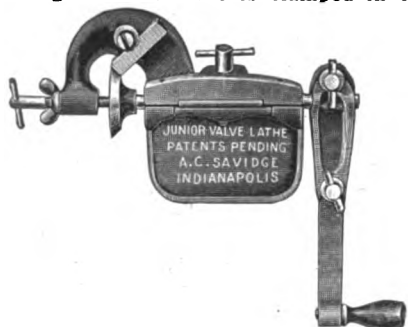
The chest is provided with a genuine leather covered handle, over a steel core, attached to nickel-steel loops by cotter pins, the loops being riveted to the cover of the chest. All trimmings are heavy, nicked and polished, including top loop fasteners and specially built 12-key change lock supplied with two flat, milled slot keys.

The tool chest is finished inside with a dark oak stain and outside in golden oak, filled, stained, primed and varnished with a high grade, waterproof varnish, dull finish.

The chests may also be supplied with leather covers, the construction being the same as the plain wooden chest, being covered with the best grade of imitation leather, which is water proof.

Manufactured by the Union Tool Chest Co., Rochester, N. Y. Prices on request.

The Junior Valve Lathe for Ford Engine Valves is designed for the motorist who wishes to true and grind the valves of his engine. The lathe is clamped in the



vice and operated with the turning handle, or may be held with one hand while being turned by the other.

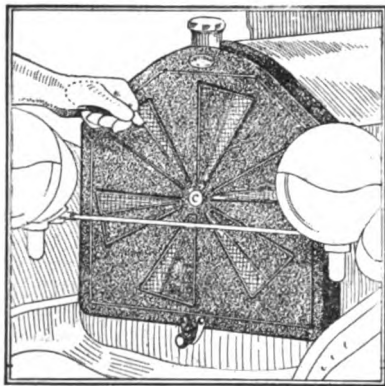
The Junior lathe is constructed from the best of iron and steel and is finished in gray, nickel plated. It is equipped with an adjusting screw and wing nut gauging the pressure exerted on the head of the valve and holding it against the cutting tool. It is designed especially for cast iron head valves up to 1 1/4 inches in diameter and with 5/16-inch stems.

The Junior valve lathe makes an ideal equipment for Ford repair shops and service stations.

Manufactured by A. C. Savidge Co., Indianapolis, Ind. Price, \$5. Extra cutter, \$1.

"Antidam" Heat Retaining Radiator Cover is a heavily padded radiator cover having a patented adjustable feature that makes it a desirable radiator for the motorist who is obliged to use his car during the winter months.

The adjusting feature is formed similar to a cooling fan, fitting in the front of the cover, and is easily adjusted by a slight pressure of the fingers, allowing the free



circulation of air through the sections of the radiator core during warm days and may be partially closed during extreme cold weather.

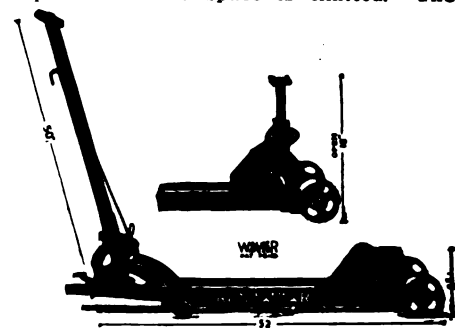
Antidam Radiator Covers are made of the best of material obtainable and heavily padded to keep out the cold and keep in the heat of the engine. Made in sizes to fit any model radiator.

Manufactured by the Glover Equipment Co., 412 Capitol Boulevard, Indianapolis, Ind. Prices, \$6 to \$8. Sold by dealers everywhere.

The Walker Roll-A-Car Jack consists of a lift jack mounted on a steel frame, having fixed rollers at the jack end and castor rollers at the rear. A long upright handle is fastened at the rear by which the jack is moved, raised or lowered. A slight pressure on the handle tilts the jack back on to the rear castors, raising the front wheels from the floor and allowing the jack to be guided into any position. The raising or lowering of the jack

or the locking of the handle is controlled by a small lever on top of handle. A foot pedal is provided to quickly raise the jack bar to proper height under the axle of car; the same pedal drops the rack after the jack is removed from under the car.

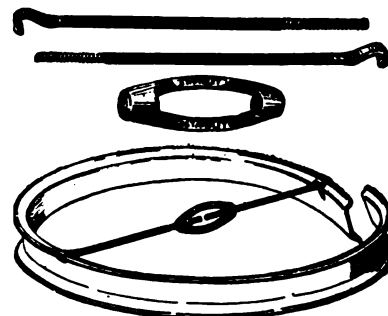
Six strokes of the handle raises the jack six inches in a few seconds, it is stated, the jack being lowered in same manner by reversing the lever. After the car is raised the handle on the Roll-A-Car can be placed in an upright position without lowering the car. This feature is very important where space is limited. The



pressure required to operate the device is claimed to be very small; the average car can be raised by the operator with one hand.

Manufactured by the Walker Manufacturing Co., Racine, Wis. Price, \$50. Capacity lift in pounds, 5000; weight, 120 pounds.

The Standley Rim Tool is a device for facilitating the removal of tires from demountable rims. It is made in three sections, two rods and a turnbuckle, the rods having right and left hand threads respectively so that they may be tightened by the turnbuckle. One end of the rod is hook shaped so it may be slipped over the edge of the rim. When using the tool the operator places the hooks over the rim, first starting the threaded ends into the turnbuckle. Turning the turnbuckle to



the right opens the rim, allowing the tire to be slipped over the edge. To replace the tire the operation is reversed.

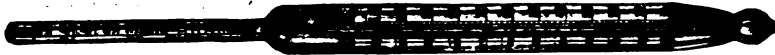
Manufactured by the Standley Skid Chain Co., Boone, Ia. Price, East of the Rockies, \$6; West of the Rockies, \$6.50.

(When Writing to Advertisers, Please Mention the Automobile Journal.)

"Genco" No. 111 Freesometer consists of an instrument, similar to a thermometer, to be used in testing the cooling medium

system. The instrument is guaranteed for one year.

Manufactured by the General Scientific



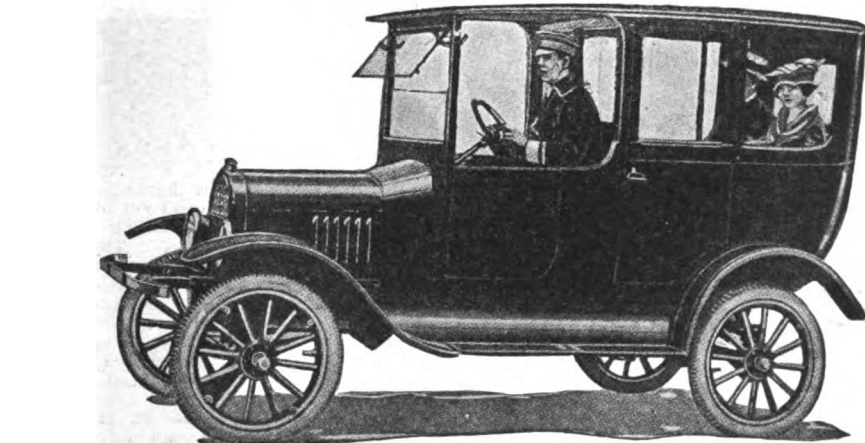
of the engine radiator, especially during winter months when some form of non-freezing solution is used in the cooling

Equipment Co., 2718 West Lehigh Avenue, Philadelphia. Prices and literature on request.

The New Taxicab or Limousine Body for the Ford Chassis is a new body that has recently been introduced to the trade. The body is made somewhat different for taxicab work than for private use as a limousine, especially in the front compartment of the driver.

For taxicab work the left hand door is left off, the floor is slatted and only one seat is provided. For private use the door is used and the seat is continuous so that the driver and one passenger may be ac-

commodated. The rear compartment is provided with the regulation three-passenger seat and two extra folding seats for emergency use.



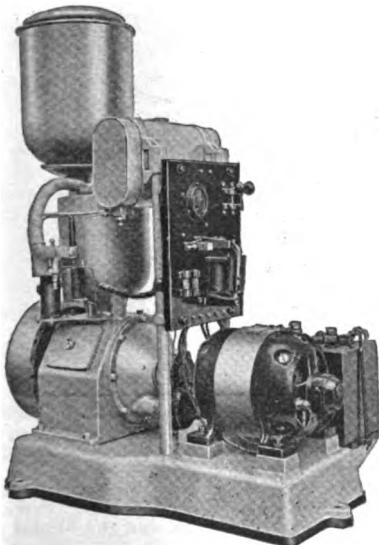
Still another type of body is made and this is known as the landaulet limousine, this body having the added feature of being an all-year body for either private use or taxicab work. The top in this body folds down over the rear compartment for summer use and for winter is in an up-

right position, as a limousine or closed car. A special windshield is provided, having upper and lower sections, with the upper section hinged in such a manner that it swings forward. The regular equipment includes the windshield cleaner. The partition between the front and rear compartments is of glass, in two sections, that may be lowered. Doors are equipped with drop glass ventilating windows which slide down into the velvet lined channel

in door panel. Interior trimming is of Spanish leather, and the roof and sides are trimmed to match. A roll-up curtain is provided for rear window and a set of side curtains for the driver's compartment. Electric dome light furnishes illumination in the passenger's compartment.

Manufactured by the Anchor Top & Body Co., Cincinnati, O. Price and literature on application.

The Holt Electric Power-Light Plant for the service station where city power is not available and the farm home. The Holt plant does not require a set of storage batteries from which current may be drawn when the plant is not working, but operates automatically whenever a light is turned on or a piece of electrical apparatus is used, such as a motor, toaster, percolator or other apparatus. The plant consists of a gasoline engine of the four-cycle, water cooled, valve-in-head, removable cage, vertical type. Bore and stroke



2 3/4 x 3 inches, normal 1600 revolutions per minute. An electrical starter is made a part of the generator.

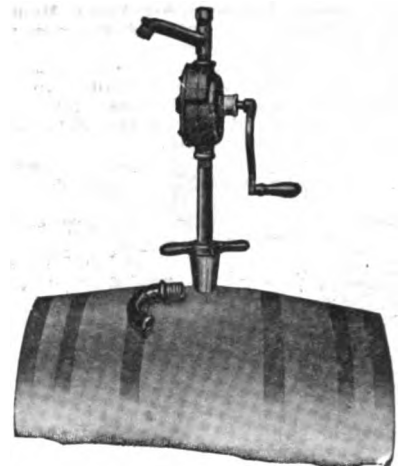
One end of the generator is wound for a six-volt current, supplied by a single six-volt storage battery, and is used solely for starting the engine. The opposite end of the generator is wound for a 110-volt current and is used for lighting and power purposes. The capacity of the generator is 25-30 watt lamps or several pieces of electrical apparatus at the same time. The lights do not flicker, but glow with a steady white light.

The capacity of the water supply tank and condenser is 4 1/2 gallons; starting and ignition battery six-volt, 86-ampere capacity; ignition, Atwater Kent; carburetor, float feed type with hot air connection to cylinder; oiling system, automatic, with one place provided to oil entire system; governor, electric solenoid type, assembled as a unit with the carburetor; special generator, compound, wound, multipolar type with double commutator, six-volt at one end and 110-volt at other, built by the General Electric Co. A simple control switchboard is mounted on two vertical standards. The complete plant is assembled on a strong iron base.

The Holt plant is economical in operation, as it develops power according to the demands required of the current developed by it. When burning one light the power is in proportion to the current consumed and when operating at full capacity the power developed is in proportion to the work required of its current.

Manufactured by the Automatic Light Co., Inc., Ludington, Mich. Price, \$450 f. o. b. factory.

(When Writing to Advertisers, Please Mention the Automobile Journal.)

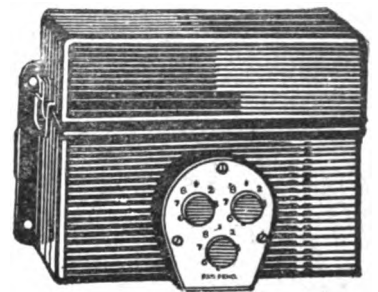


The No. 9 Hand Transfer Oil Pump is of the rotary type to be used by garage and service stations for the transfer of oil from shipping barrels or tanks to the garage or service station oil containers. The outfit includes the pump and a taper bung attachment for use with wooden barrels, or a special holder for use where steel shipping drums are used, which protects the threaded hole and holds the pump rigid. The crank is made of malleable iron and is fitted with a wooden hand grip. A non-drip spout is furnished having a tubular hook for end of hose to hook into barrels. A malleable iron spout may be purchased in place of the regular spout to reach from the center of drum to the center of the can being filled.

The pump has the "take-up-for-wear" feature that is typical of all Blackmar pumps. The weight is only 30 pounds complete with all attachments. The pump has a capacity of one-eighth of a gallon per revolution and one-inch connections. A suction pipe 36 inches long is furnished with each pump. The pump is guaranteed against rust or corrosion when fitted with bronze buckets.

Manufactured by the Blackmar Rotary Co., 1347 Book building, Detroit. Prices on request.

The Christie Auto Lock for Ford Cars consists of a combination lock attached to the regular Ford coil box in place of the regular ignition switch. There are three combination dials with the numerals running from one to eight. It is claimed that the lock is thief proof, as there are no tumblers in the lock and all wires are so enclosed that they cannot be reached. When the lock is on the coils are also

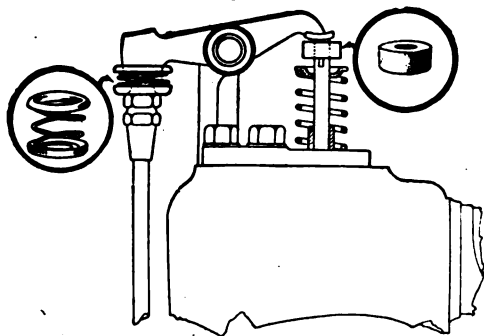


locked so that their removal is said to be impossible.

In attaching the Christie lock the heads of the bolts are covered by the top of the lock and cannot be removed. The cover cannot be removed when the lock is on. The Christie can be locked and unlocked rapidly. The combination may be changed to suit the owner and as many times as desired in about 90 seconds. Every time a new combination is tried it is necessary to get out and crank the car to see if it is unlocked, as tumblers are not used in the lock.

Manufactured by the Christie Auto Lock Co., 6607 Dorchester Avenue, Chicago. Price, \$6.

Automatic Take-Up for Valve Mechanism of Buick and Oakland Engines consists of a spring exerting three pounds pressure between the ball and socket of the rocker arm push rod joint, two caps holding the spring in place and a felt washer that is placed on the valve stem above the fastening pin.



The object of the spring is to exert sufficient pressure between the ball and socket joint to keep the push rod pressing firmly against its cam and the rocker arm bearing firmly on the top of the valve stem. It is stated that the use of this spring device helps to reduce wear at the ball and socket joints by stopping the sudden knock of the push rod ball when it comes in contact with the socket of the joint, silencing the contact and causing the parts connected with each to wear longer and to operate more quietly. The felt washer on the valve stem is filled with engine oil every 300 to 500 miles and keeps the valve stems lubricated, preventing excessive wear and compression leaks.

Sold by H. L. Frey Sales Co., 418 Beard Avenue, Buffalo, N. Y. Prices, Buick Six, \$3.50; Buick Four, \$2.50; Oakland, \$3.

The Simplex Rim Remover is a tool for opening and closing split rims of the demountable type. This device works on the principle of a turnbuckle, the turnbuckle being operated by a hand wheel, that is easily turned by the hand of the operator. Clamps are fastened to the rim at each side of the split, while turning the hand wheel in one direction contracts the rim for removal, turning the wheel in the opposite direction expands the rim, when replacing it in the tire.

The device is made unusually strong, the jaws, hinges and bolts are steel, while the turnbuckle and wheel are castings.

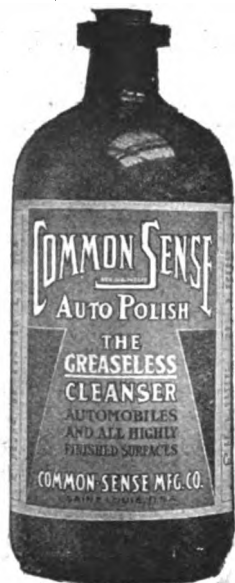
The Simplex rim remover is manufactured in two sizes. No. 1 for use of the motorist and is of a size that is readily folded and carried in the tool box; No. 2 is larger and designed for service station and garage use, but is made similar to No. 1, but considerably heavier and longer.



The clamps are adjustable, so that they may be fitted to individual rims by simply opening the jaws of the clamps with a screw driver.

Manufactured by the Simplex Steel Stamping & Manufacturing Co., 1926-28 Gravois Avenue, St. Louis, Mo. Prices on request.

Common Sense Auto Polish is a liquid to be used by the motorist for cleaning dust and oil from the painted surface of the automobile. This polish is a laboratory product that has stood the test for about six years and is claimed to be beyond the experimental stage. Common Sense Polish is said to be made from ma-

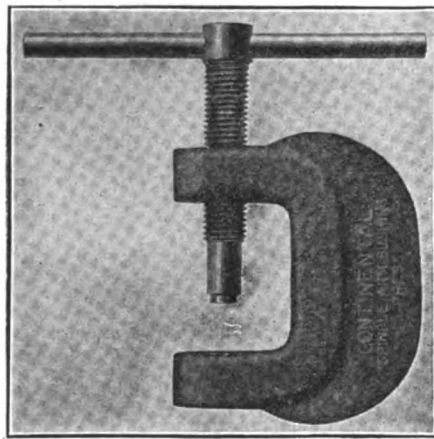


terials best adapted for this type of cleaning and when used according to directions is claimed not to injure the finish of the car in any respect.

Common Sense Polish is equally as well adapted to polishing such surfaces as rare china, porcelain, mirrors, enameled ware, etc., the blending of the different materials used in the formula being so perfect that it may be used for the purposes mentioned with perfect safety, it is stated.

Manufactured by the Common Sense Manufacturing Co., 500 North Whittier Street, St. Louis, Mo. Prices on request.

The Continental Spindle Arm Bushing Press was designed to remove and replace the worn bushings in the Ford spin-



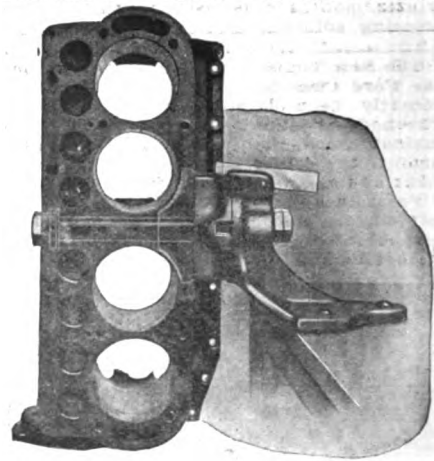
dle arm. The device much resembles a "C" clamp, but is built stronger and heavier. The device will remove bushings that are worn out on one side, as the screw is constructed to fit the shoulder of the bushing exactly, while the boss on the end of the screw exactly fits the inside of the bushing. The device is made of the best of materials, heavy cast iron being used for the clamp, while the screw is made of the best of tool steel.

The use of this tool greatly facilitates the removal of worn bushings and the replacing of new parts.

Manufactured by the Continental Auto Parts Co., Knightstown, Ind. Price, \$5.

(When Writing to Advertisers, Please Mention the Automobile Journal.)

The A. B. Motor Repair Stand is designed to hold either the Ford engine block or the complete engine assembly breast high in any of the four positions, top, bottom or either end, allowing the work to be performed with ease and rapidity when repairing, assembling or disassembling the engine. The stand is fast-

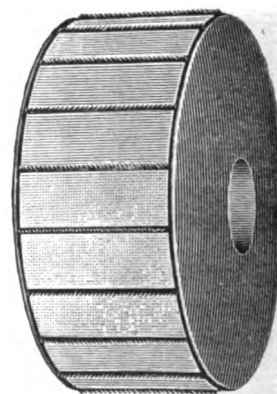


ened at the edge of the bench, allowing the work to swing clear and yet holding it in a firm grip, while the bench itself is left clean for tools and parts. The bolt is cast in the revolving part, hence it does not interfere with work on the center bearing bolts and nuts. As the A. B. stand is firmly bolted to the bench, it is never necessary to hold it with the hand.

The A. B. stand is strongly made of the best of materials and is tested to 1000 pounds, giving a large margin of safety.

Manufactured by the G. H. Dyer Co., 155 Brookline Street, Cambridge, Mass. Price, \$10.

The Taber Tire Dressing Wheel is a device for tire repairing stations and is designed to enable the repairer to accomplish his work in shorter time and in a more scientific manner. The device is used either in an emery wheel or buffing stand and it is claimed may be speeded to 10,000 revolutions a minute without injury. Its special function is to remove surplus rubber from the casing prior to vulcanizing, or when applying re-treads, half-soles or other covers. The wheel consists of a carrier, or aluminum alloy center block, which has transverse slots into which the cutting blades fit. These blades are removable and can quickly be replaced with new ones at little cost. They are held in place by rings which intersect a notch in the end of each blade and the rings are held to their seats in the sides of the wheel by two spring steel discs which constantly exert pressure on the blades.



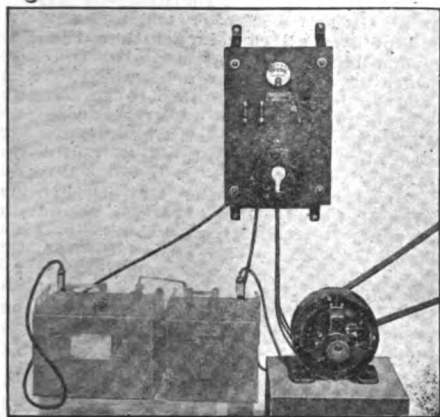
The size of the wheel is five inches in diameter, two-inch face and 1 1/4-inch opening in the center, which can be bushed to fit any arbor.

Manufactured by the T and T Tire Dresser Co., San Francisco, Cal. Price of the wheel complete, \$20, and the blades are \$6 a set.

Main Battery Charging Set No. 1 consists of a belt driven outfit to be operated from the power shaft of the service station. The outfit consists of a charging dynamo of superior design, having oil ring bearings, a high grade armature and field coils. The capacity of the generator is 300 watts and can supply 14 amperes when charging one six-volt battery or eight amperes when charging five six-volt batteries at one time. A slate charging panel is included in the outfit, equipped with ammeter, rheostat, necessary fuses, switch, an iron frame for mounting on the wall and a set of long flexible leads with universal snaps for making connections to batteries when charging.

It is stated that the probable cost to operate the main battery charging set from any source of belt driven power will run from 1½ to three cents a kilowatt-hour.

A larger outfit is manufactured by this company, which has a charging rate about three times that of the No. 1, which is de-



signed primarily for service and battery charging stations, and is capable of charging several sets of five six-volt batteries in multiple at a time; that is five six-volt batteries or any combination, such as one six-volt and two 12-volt, etc., so long as the voltage does not exceed 30, and two or three such combinations in multiple at the same time. The dynamo of the No. 3 set is similar in design to that of No. 1, but is much larger, is equipped with a flywheel pulley and furnished with sliding base for taking up the slack of the belt.

The switchboard is similar in design, but is much larger, has larger instruments, heavier switches, fuses, etc.

Manufactured by the Main Electric Co., Cleveland, O. Price, No. 1 set, \$105 f. o. b. Cleveland; No. 3 set, \$205 f. o. b. Cleveland.

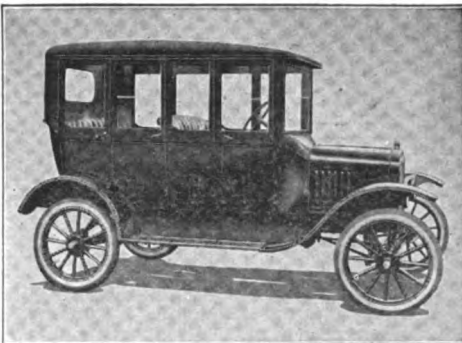
The Miller Ideal Enclosed Auto Top for Ford Cars is combined with patent Miller windshield standard, which allows the windshield to be opened for ventilation and affords complete adjustment to the



variations in length of Ford cars. The windshield rests against a heavy felt pad, preventing rain or snow from entering when closed.

The enclosed auto top is constructed of selected seasoned hard wood, having 16

bows, 18 slats and a solid back. All joints and slats are separately glued, nailed and screwed, while all sash is dovetailed at the joints, glued and nailed. Over 1000 nails and screws enter into the construc-

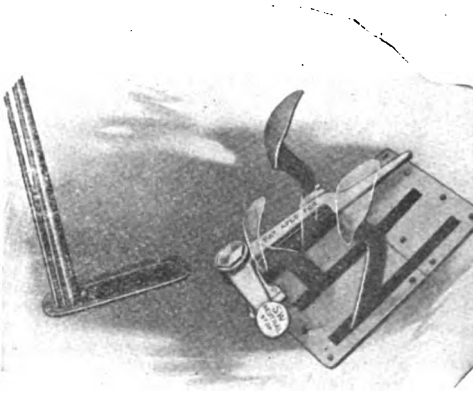


tion of a Miller Ideal auto top. The curves in the back and top are of steel and the front standards are of 20-gauge steel, adjustable. The top covering is the best grade Neverleak, lined with fine black and white whipcord. A neat metal moulding prevents rain from dripping on the windows, and the glass used in the windows is extra heavy clear vision "Crystal."

The doors and left front panel are equipped with a divided or ventilating glass. The doors open at the same time with the body door.

Manufactured by the Miller Top & Body Manufacturing Co., Caro, Mich. Prices on request.

The S-W Neutral Stop for the Ford Foot Pedals consists of a device that is fastened to the floor board of the car at the rear of the high and low pedal. The device is in two parts; one part passes forward and carries a trip arrangement that catches back of the pedal when the pedal



is in the neutral position, while the second part projects to the right out at one side, acting as a release to loosen the catch when the operator desires to push the pedal into first.

This device is small, is easily attached to the floor board and is inconspicuous and in case of an emergency catches the pedal in neutral as the foot is pushed forward, preventing the operator from moving the pedal still further forward into first and causing a possible accident.

The neutral stop does not interfere with the regular operation of the car, but does act in case of emergency. The stop is made of high-grade material and will outlast the car upon which it is attached.

Manufactured by the S-W Manufacturing Co., Lynn, Mass. Price, \$5, parcel post prepaid.

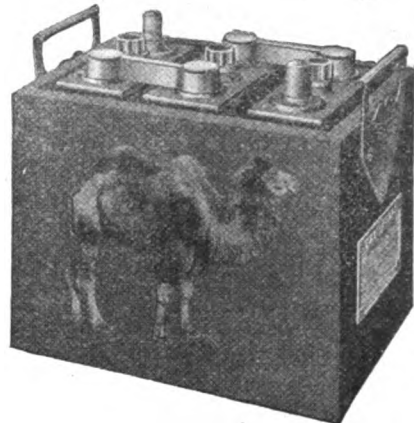
The Campbell Storage Battery is a new model, which the manufacturer has named the "Battery of No Regrets." After experiment and exacting research covering a number of years a battery has been de-

signed which is claimed to overcome many faults of storage batteries in the past.

The grids are of a design possessing great strength and flexibility capable of taking and holding the proper charge and giving the correct discharge without undue harm to the battery. Grids are pasted by hand, pass under a rigid inspection; none but perfect plates being used in the construction of the finished batteries.

The jars are guaranteed to withstand a strain of 3600 pounds a square inch, much heavier than they will ever be called upon to receive, while the result is greater durability in service. Each jar is tested with an electric current of 36,000 volts, so that any leak or defective spot becomes apparent before the battery is assembled.

The separators are resawed Port Orford white cedar, each separator being rigidly inspected before being used. This wood has been proved to be the best for battery separator use, it is stated. Battery cases are made of select kiln dried oak, dove tailed, no nails or screws being used.



Treated and painted with acid proof paint.

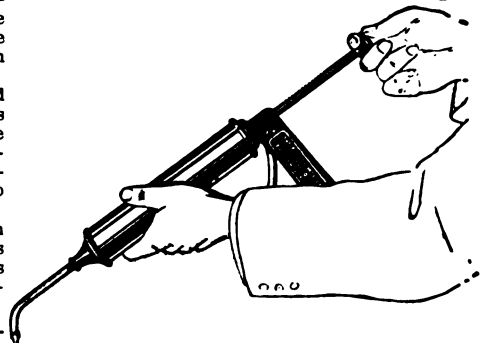
The battery post construction is such that it is stated it is impossible for them to become broken or to leak. Large vents are provided in the top of each cell through which distilled water may be added to the electrolyte or the electrolyte tested.

Campbell batteries are covered by a 12 months written guarantee, given the purchaser on the date of sale.

Manufactured by Campbell Electric Co., Inc., 1529-31 Wyandotte Street, Kansas City, Mo. Prices on request.

The Vital Automatic Grease Gun combines two devices in one, a pressure gun for heavy grease and oil operated by a trigger and pistol grip and a pump for light oils or gasoline actuated by pushing the plunger by hand.

The cylinder is made of the best of material and the caps, top and bottom are made of cast metal smoothed and polished. Two nozzles are furnished, one for light oil and the second for grease. The pistol and trigger action makes the gun



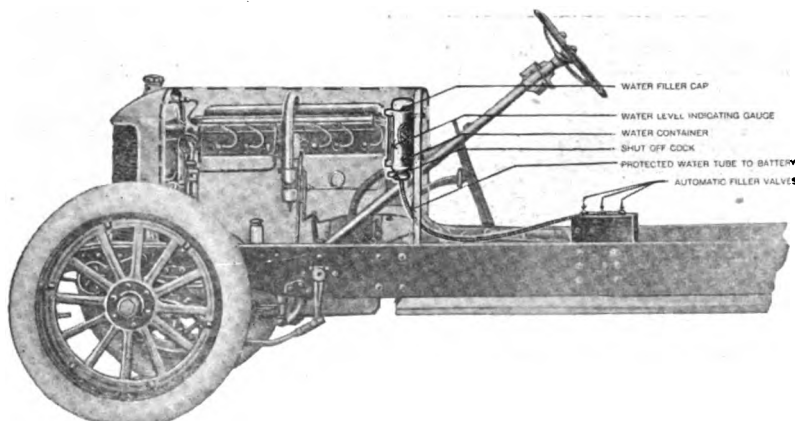
very easy to operate even with one hand. The cap on one end unscrews, so that the gun is easily loaded with grease, while the offset nozzle permits inaccessible places to be reached.

Manufactured by the Vital Manufacturing Co., Cleveland, O. Price \$5.

(When Writing to Advertisers, Please Mention the Automobile Journal.)

The 20th Century Automatic Water Filler for Storage Batteries consists of an aluminum water container of about one pint capacity, screwed to the dash board under the hood. A gauge at the side of

goes down the valve opens and allows just enough water to drop into the battery cells to bring the electrolyte to the proper level and the valve then closes. A petcock just below the container allows



container shows the water level at all times, the water flowing to the battery through a flexible metal covered rubber tube to the caps of the battery. Special hard rubber filler caps containing a float valve are furnished with each outfit to be substituted for the regular caps of the battery. As the level of the electrolyte

the water to be shut off at that point if desired.

Sold by Forrest Co., Inc., distributors of West Gasaver and 20th Century automatic battery water filler, 1974 Broadway, New York City. Price, \$10. When ordering give make and model of car, location of battery and name and type of battery.

The Eureka Automobile Heater is a device heated by exhaust gases and is placed in the rear compartment of the car, fitting flush with the floor boards and opened or closed by a small lever at the side that may be operated by the foot.

The radiator is made of aluminum, the exhaust gases enter at the side through a pipe having a flexible connection with the exhaust pipe, heating by transfusion the pure air which enters the car body through openings in the floor plate, while the gases escape through a pipe outlet at the side of the car.

The Eureka heater is constructed on scientific principles, by which all operating expense is eliminated, as the waste

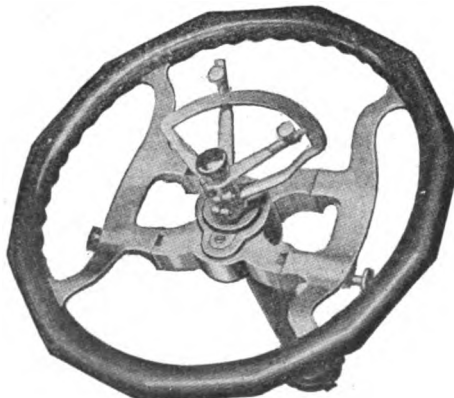
operation. The gasoline does not pass through the Vacuumeter on its way to the vacuum tank, but the device is operated by the vacuum in the tank.



It is stated that the readings of the Vacuumeter are absolutely accurate and that by its use owners of cars equipped with this device are enabled to tell how much gasoline is consumed for a trip or for the season, besides acting as a check on the adjustment of the carburetor.

Sold by the Vacuumeter Selling Co., 1410 Girard Avenue, Philadelphia, Pa. Price, \$18.50.

The Tilting Lockable Steering Wheel is manufactured in three styles of rim. The first, known as the Liberty model, is equipped with either a 17 or 18-inch wheel as desired, and is fitted with interchangeable



(When Writing to Advertisers, Please Mention the Automobile Journal.)

able bushings in the hub of the wheel to fit all types of automobiles and steering shafts. The wheel consists of a polygon corrugated walnut rim, with aluminum spider arms, buffed, polished and inserted in the wheel rim, the spider head being constructed of malleable iron and the center bushing of steel, sherardized to match the aluminum finish.

The second style is similar in construction to the first, but differs from it in that the wheel is corrugated on the inner side and smooth on the outside. Either style may be tilted up or down to suit the convenience of the driver, by means of pull pins in the spider arms. When pulled out the wheel passes by projecting arms at each side of the center or hub and is hinged at the front of the hub by two similar projecting arms. A Yale lock is provided in the hub of the wheel by which it is locked in such a manner that the wheel turns freely on the steering column without operating the steering mechanism. It is stated by the manufacturer to be proof against theft.

A tilting lockable steering wheel is adapted to all cars larger than the Ford, a smaller style being made for the latter working on the same principle, the wheel and spider being similar to the regular Ford equipment, but differing from it in that the locking and tilting features are combined in one unit, as in the larger sizes.

Manufactured by the Detroit Steering Wheel Corporation, 1231-35 Woodward Avenue, Detroit, Mich. Prices, No. 1 and No. 2, Liberty model, 17 and 18-inch, \$29; No. 3 and No. 4, Liberty model corrugated, 17 and 18-inch, \$24.50; Ford model, 16-inch corrugated, \$18. Specify make and model of car when ordering to secure bushing required in the hub of wheel.

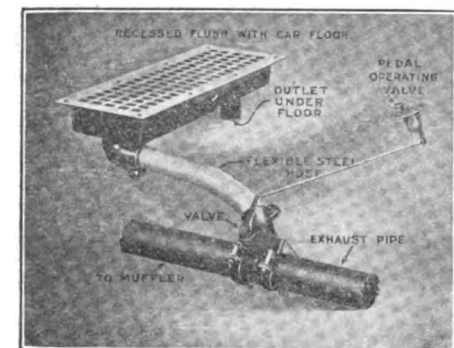
The "Shuro" Cell Tester is designed for storage battery service station testing and shows, by short-circuiting each individual cell, the condition of the charge of that cell. This instrument is specially designed to meet the constant demand of the battery expert and the automobile owner. The simultaneous voltammeter is



mounted in a position by which it can be easily read and is amply protected. The light above the voltammeter will quickly indicate the condition of the cell being tested.

The simultaneous voltammeter has a double scale, the upper reading volts 0-2, the lower amperes 0-250, which gives accurately the voltage of each cell under a discharge test. Full instructions accompany each tester.

Manufactured by H. B. Shontz Co., 157 West 54th Street, New York City. Price with meter, \$17; without meter, \$8.50.



gas from the exhaust is utilized. The heater is made of aluminum and pressed steel, finished in nickel, and is claimed to combine the essential points of lightness, strength, appearance, radiation and economy.

It is stated that this system can be installed in one hour's time by any good mechanic.

Manufactured by the Eureka Accessory Company, 404-405 Dollar Bank Building, Youngstown, O. Price, \$20, complete.

The Vacuumeter is a neat dash board instrument of the speedometer type that tells the amount of gasoline in the fuel tank, total gallons used to date, gallons used per trip and also indicating in a special window whether the vacuum is in working order or not by a shutter changing from white to red.

The Vacuumeter is connected to the top of the Stewart vacuum tank by a short length of copper tubing, which is the only connection necessary for its successful

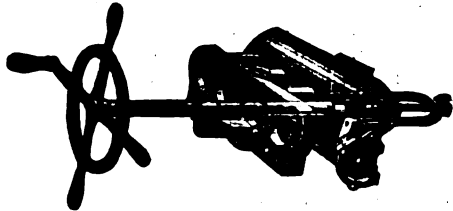
Heiser's Improved Cylinder Reboring Machine for the Ford Engine is a tool for the Ford service station repair shop and comprises many unusual features that recommend it especially for cylinder reboring work.

This tool rebores between centers, insuring a finished cylinder that is square with the crank shaft, as well as being straight, round and true. The cutters leave a finish closely resembling a ground finish. This is the only tool, except expensive grinders, it is claimed, that will not leave the finished cylinder slightly tapered towards the bottom.

The left side of the Ford cylinder always suffers the most wear. For this reason it is impossible to hold the compression with new or over-size piston rings, without first trueing out the cylinder. The cylinder must be as true as the rings for perfect work.

Reboring and fitting over-size pistons is the most important repair that can be given an engine, for by fitting these parts properly, they are made as tight, true and new as the day the car was first delivered.

The time required to rebores all four cylinders with the Heiser's improved reboring machine is from 60 to 90 minutes. The machine is self-centering, as it centers itself from the unworn portion of the engine cylinder. The reboring tool is fastened at the top of the cylinder by a special bracket that holds the shaft of the



tool in a rigid position, while the base end is fastened by a plate extending across the base of the cylinders and fastened to the base by screws, thus holding the lower end of the shaft rigid.

The cutting bit is sharpened and given the correct amount of clearance without an emery wheel, or the necessity of sending it to the factory, or to a machine shop, as it may be sharpened by any one handy with sharpening tools.

The Heiser reboring tool is operated by a hand wheel having an increased leverage so that the operation of the cutting tool is very easy. The cutter is adjustable so that cylinders may be bored to any size desired, from those that have only seen a few months service to those that have been in service for many years.

The maker states that centering of the cutter is easily accomplished after a trial and once properly set does not have to be changed to rebores the other cylinders of the set.

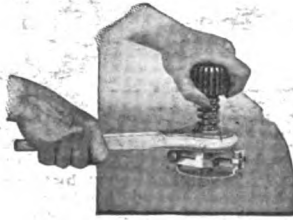
Manufactured by the Heiser Special Tool Co., Kingston, Mo. Prices, \$42, cash with order. Over-size pistons, complete with rings, pins and bushings, .015, .031, \$1.60; .045, \$1.90.

The "Jiffy" Adjustable Cutter is a small portable tool designed to cut holes varying from 1 1/4 inches to six inches in diameter. The Standard knives, supplied with the device, will cut through steel 3/16 of an inch in thickness. Special knives can be supplied for cutting through 1/2-inch metal and also knives for cutting holes in one-inch material, such as slate, marble, fiber, etc.

The device is made in three sizes. No. 1 outfit cuts holes from 1 1/4 inches to three inches in diameter, and the No. 2 outfit from 1 1/2 inches to six inches in diameter. The No. 12 outfit is a combination of both of these sizes.

In addition to the holder and ratchet wrench the outfit consists of a small knife holder wrench for adjusting the knives. New knives or cutters can be secured as they are needed. The appliance is especially desirable to electrical men and service station repairers.

The tool consists of a swing chuck with two knives adjustable to various centers. The swing chuck is a steel casting. Pressure is put on the knives by means of a heavy spring. Rotation of the knives is secured by applying to the swing chuck a special ratchet wrench, made of malleable iron.

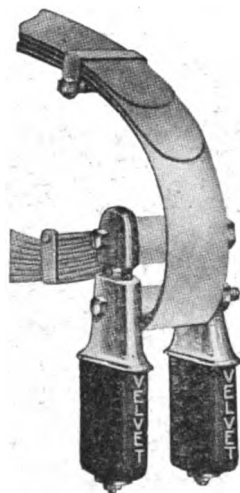


A 3/8 inch pilot hole is first drilled, and in the case of thin material a flange nut is put on the opposite side of the sheet so that the stud may be placed through the pilot hole and screwed into the flange nut. For cutting heavy material the pilot hole could be tapped with standard thread for receiving the stud, thus eliminating the use of the flange nut where it might be difficult to get back of the material to place the flange nut in position.

Outside of the many ordinary applications, such as cutting holes in service and distribution cabinets, boiler tanks, dash iron, steel plates and sheets, etc., there are many special applications, such as cutting holes in heavy structural steel members, and where awkward shaped castings, which cannot readily be drilled by machine process, are encountered. This tool should prove of value in cutting through plates where it is not practical to set up gas flame cutting outfits. Special washers can be quickly cut by setting one of the knives at the inner diameter of the washer and the other at the outer diameter. The tool cuts holes in a neat and clean manner, and work can be done much better and much faster with it than by the old method of cutting holes with a hammer, cold chisel and punch.

Manufactured by Paul W. Koch & Co., 19 South Wells Street, Chicago, Ill. Prices and literature on request.

Velvet Shock Absorbers, Model E and Model F for cars with half-elliptic springs are attached by special shackles to the rear of the spring ends. A feature of the Velvet shock absorber, that especially appeals to the motorist, is the fact that in changing them from one car to another it is unnecessary to discard them and pur-



chase new shock absorbers as the springs may be removed and replaced with heavier or lighter springs according to the weight of the car to which they are to be attached.

Velvet shock absorbers have an adjustable feature, by which they may be made either stiff or light, according to the load carried by the individual car.

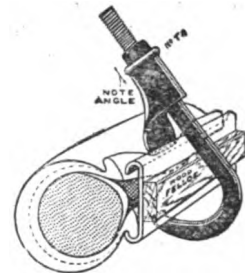
The absorbers are simple in construction, are made throughout of the best of material by skilled workmen, and are made in different sizes for cars weighing from 2200 pounds up to 4800 pounds. In ordering, give make, model and year of car, also weight of car, width of the rear springs and diameter of rear spring bolts. Also mention whether the car is a touring car, runabout or closed car.

Manufactured by John W. Blackledge Manufacturing Co., Chicago, Ill. Prices on request.

Essenkay Tire Filler for passenger car and light truck owners using pneumatic casings consists of a prepared filler, put up in a convenient form for handling, and connected in lengths according to the size of casing in which they are to be used.

The filler is placed in the casing and forced on to the rim of the car wheel with a special tool provided for that purpose.

It is stated that with Essenkay tire filler the casings wear down to the last layer of fabric when the filler is removed and placed in another casing and are used



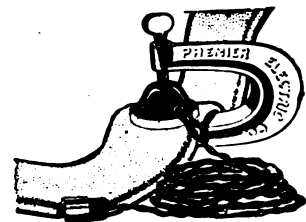
indefinitely, this operation being repeated as often as the casings wear down. It is pointed out that Essenkay tire filler contains no rubber, therefore it cannot harden, oxidize or bloom.

The manufacturer has a free trial offer to owners of passenger cars and trucks that is very liberal. It is stated that Essenkay is the ideal solution of tire problems for the owner of any vehicle which requires easy riding, shock absorbing tires which at the same time are not subject to deflation by means of punctures or blow-outs.

Manufactured by the Essenkay Products Co., Grand Avenue and Orleans Street, Chicago, Ill. Prices on request.

It's-It Electric Vulcanizer for the motorist's tool kit is an emergency outfit for vulcanizing tubes by the electrical current taken from the storage battery of the car in case of emergency.

The vulcanizer is small and easily placed in the tool box. When using the patch is placed on the roughened tube in the usual manner, the clamp screwed down tight and the plug on the end of the cord placed in a socket provided for it on



the dash or other convenient place on the car and the current from the battery turned on. It is stated that about 10 minutes are required to vulcanize a patch with this device, that the amount of current drawn from the battery is small and that the patch is vulcanized as thoroughly as though done with a larger outfit.

Made either for six or 12-volt batteries and furnished complete as shown with patches ready for use. When ordering mention voltage and style plug desired.

Manufactured by the Premier Electric Co., Grace and Ravenswood Avenue, Chicago, Ill. Price, \$1.

(When Writing to Advertisers, Please Mention the Automobile Journal.)

INCREASING PRODUCTION BY MULTIPLE OPERATIONS.

One of the principal products of the Wisconsin Parts Co., Oshkosh, Wis., is worm-driven axles of varying capacities, and to secure economy of production it has been found expedient to employ devices which render possible the milling of multiple units at one operation. In this work it is necessary that the same accuracy be afforded as when the units are turned out singly.

The accompanying illustration shows a Beman & Smith planer type milling machine that was recently added to the equipment of the plant.

As will be noted, the machine is equipped with four milling heads, so that four operations can be completed on eight axle housings at one time. The machine is driven by direct current motors, directly connected with all controls in reach of a single operator.

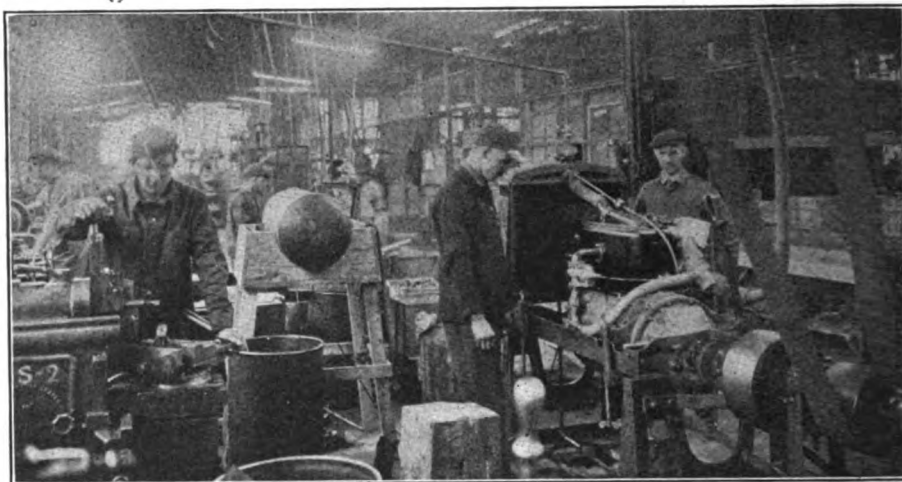
The great table or platen of the machine is driven by a worm which is so constructed to have slow feed and quick return. The tool will machine 200 housings in an eight-hour day, eight at a setting, and do the work precisely alike.

The Wisconsin Parts Co. is to construct an addition to the main plant to be 240 feet long and much new machinery will be installed in order to supply the rapidly increasing demand for the company's products. This concern claims to be the largest manufacturer of rear axles for trucks in the industry not affiliated with other parts makers or builders of trucks.

AUTO METAL CO. ENLARGES.

The Auto Metal Co., Springfield, Mass., has purchased from the Stoddard Motor Car Co. the real estate in that city on Columbia terrace and Nursery street, which has been used as a service station. The Auto Metal Co. has an extensive contract for automobile bodies.

Buda Motor Truck Engine Runs Service Co's Machine Shop in Emergency



Buda Engine Temporarily Installed to Supply Power at Service Motor Truck Co.'s Plant, Wabash, Ind., During Coal Shortage.

AUTOMOTIVE manufacturers throughout the Middle West met the recent serious conditions threatened by coal shortage in a manner which displayed their resourcefulness and ingenuity, and in many cases kept their factories temporarily under operation, when denied electric power supplied by coal-consuming plants, by novel means. In a number of instances the oil burning power plants of tractors were utilized with complete success and the adaptability of this type of equipment was demonstrated.

As shown by the accompanying illustration, the Service Motor Truck Co., Wabash, Ind., rigged up a Buda $4\frac{1}{4}$ by $5\frac{1}{2}$ engine, made by the Buda Co., Harvey, Ill., such as it uses in its $1\frac{1}{2}$ -ton model 36 and $2\frac{1}{2}$ -ton model 51 motor trucks, on a testing stand and was able to keep its machine shop in operation. The Buda engine in question ran contin-

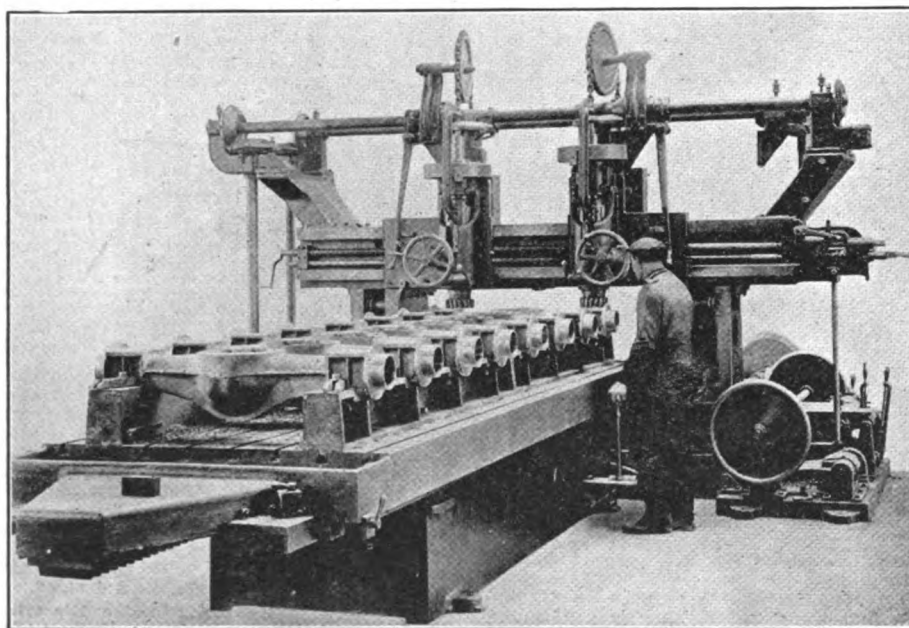
uously at full speed from 7 a. m. to 12 o'clock noon and from 12:45 to 4 p. m. It furnished sufficient power for the operation of two large radial drills, eight lathes, four shapers, 10 drill presses, six milling machines, two threading machines, four tool grinders, one key setter and one tapping machine. Several other engines of the same type were installed in various parts of the plant so that the factory was kept running to capacity. It is stated that the Buda engines performed this unusual work as easily as did the electric motors ordinarily used, though of course the motors were installed in more advantageous positions.

HOW APPERSON MET THE EMERGENCY.

The coal crisis was met by the Apperson Brothers Automobile Co. at its factories at Kokomo, Ind., in a characteristically ingenious manner. Twelve Apperson Eight motors, registering on dynamometer test approximately 85 horsepower each, were installed in the motor block test department which, operating a like number of dynamometers and acting in conjunction with generator sets, produced a sufficient horsepower to run the factory as under normal conditions.

BARNEY OLDFIELD'S LIFE.

Since his retirement from the automobile race track a year ago to become president of the Oldfield Tire Co., Cleveland, O., Barney Oldfield has compiled the records of the stirring events of his racing career covering the last 25 years, and it has been issued in attractive form for general distribution by the Oldfield Tire Co., under the title "I Trusted My Tires." The brochure includes an interesting chapter on the development of the pneumatic tire, to the perfection of which the "Master Driver" so signally contributed, and in the final chapter Mr. Oldfield himself discusses tire engineering and tells how an expert judges tires.



Beman & Smith Planer with Four Milling Heads, with Which Four Operations Are Made on Eight Axle Housings at One Time in the Plant of the Wisconsin Parts Co., Oshkosh, Wis.

CALENDAR OF COMING EVENTS

Jan. 26-27—Chicago, Ill., Third Annual Members' Meeting, National Automobile Dealers' Association, La Salle Hotel.

Jan. 26-31—Amsterdam, N. Y.; automobile show, benefit of Co. H, N. Y. State Armory, Amsterdam, N. Y.

Jan. 26—Elmira, N. Y., Annual Meeting, Auto Trade Association.

Jan. 27—Atlanta, Ga., Annual Convention, Georgia Automobile Dealers' Association.

Jan. 27—Chicago, Ill., Annual Meeting, Congress Hotel, National Association Automobile Show Managers.

Jan. 27-30—Louisville, Ky.; convention Kentucky Hardware and Implement Dealers' Association.

Jan. 27-30—Portland, Ore.; convention, Oregon Hardware and Implement Dealers' Association.

Jan. 28—Chicago, Ill., Truck and Tractor Meeting, Society Automotive Engineers.

Jan. 28-31—Louisville, Ky.; Kentucky Hardware and Implement Dealers' Association; M. J. Stone, secretary.

Jan. 31-Feb. 7—New Brunswick, N. J., Annual Automobile Show, Armory, W. A. Kuehn, manager.

Jan. 31-Feb. 6—Kansas City, Mo., Motor Car Dealers' Show, Overland building, E. E. Peake, manager.

Jan. 31-Feb. 7—Minneapolis, Minn., Twin City Automobile, Truck, Trailer and Industrial Exposition, Minneapolis Automobile Trade Association, Walter R. Wilmot, manager.

February—Chicago, Ill., International Automobile Managers' Congress.

February—New York City, Marine Motors Meeting, Society Automotive Engineers.

February—Deadwood, S. D.; annual show, Deadwood Business Club; F. R. Baldwin, manager.

February—Montreal, Quebec, Dealers' Show.

February—Manchester, England; North of England motor exhibition.

Feb. 2-7—Kansas City, Automobile Show.

Feb. 2-7—Toledo, O., Car and Truck Show, Terminal Auditorium, Toledo Auto Shows Co.

Feb. 3-7—Baltimore, Md., Car Show, Fifth Regiment Armory, Baltimore Dealers' Association.

Feb. 9-11—Wichita, Kan., tractor and farm machinery forum, Wichita Thresher-Tractor Club.

Feb. 9-13—Louisville, Ky.; annual show and convention, American Road Builders' Association; 10th annual good roads congress; 11th annual good roads show.

Feb. 3-13—Charlotte, N. C., Show of the Carolinas, Lee Folger, chairman, show committee.

Feb. 9-14—Nashville, Tenn.; Annual Show, Nashville Auto Trade Association.

Feb. 9-14—Kansas City, Mo.; Fifth Annual National Tractor Show, Kansas City Tractor Club, Guy H. Hall, manager, Sweeney building.

Feb. 10-14—Greenfield, Mass.; automobile show, benefit of Co. A, Massachusetts State Armory, Greenfield, Mass.

Feb. 10-14—Quincy, Ill.; Second Annual Automobile Truck and Tractor Show.

Feb. 12—Kansas City, Mo., Tractor Meeting, Society Automotive Engineers.

Feb. 14-21—Brooklyn, N. Y., Ninth Annual Brooklyn Automobile Show, 23rd Regiment Armory, Brooklyn Motor Vehicle Dealers' Association.

Feb. 15-20—St. Louis, Mo., St. Louis Automobile Show.

Feb. 16-20—Manchester, N. H., Automobile Show, Academy (only show in state), J. J. Callahan, manager, box 805, Pittsfield, Mass.

Feb. 16-21—New Haven, Conn., Annual Truck Show, Arena, New Haven Automobile Dealers' Association.

Feb. 21-28—Ottawa, Canada, Motor Show.

Feb. 23-March 6—Birmingham, England, British Industries Fair.

Feb. 23-28—Automobile show, benefit of Co. F, Massachusetts State Armory, Pittsfield, Mass.

Feb. 23-28—Louisville, Ky.; 12th annual convention, Automobile Dealers' Association, First Regiment Armory.

Feb. 23-28—Portland, Ore., Winter Automobile and Truck Show, Portland Automobile Trade Association, M. O. Wilkins, manager.

Feb. 23-28—Bethlehem, Pa., Sixth Annual Lehigh Valley Show, Coliseum, J. J. Elliott, manager.

Feb. 23-28—Duluth, Minn., Car Show, Automobile Dealers' Trade Association, W. F. Daly, manager.

Feb. 23-28—Grand Rapids, Mich., Commercial Car, Truck and Tractor Show, Automobile Business Association.

Feb. 23-28—Springfield, O., Car and Accessories Show, Memorial Hall, Springfield Automobile Trades Association.

Feb. 23-28—Waterbury, Conn., Automobile Show, Auditorium, Guy A. Parsons, manager.

Feb. 23-March 6—Utrecht, Holland, Fourth Annual Fair of Dutch Products.

Feb. 24-March 1—Kansas City, Mo.; motor car dealers' show, Convention Hall; trucks, passenger cars and accessories.

Feb. 27—Waterbury, Conn., Annual Meeting Auto Dealers' Association.

Feb. 28-March 6—Newark, N. J., Newark Automobile Show, First Regiment Armory, Claude E. Holgate, manager.

March—New York City, Airplane Meeting, Society Automotive Engineers.

March—New Orleans, La., Fashion Show, March—Jersey City, N. J., Automobile Show.

March—Adelaide, Australia; all-Australian exhibition of motor vehicles, airplanes, engines and automotive equipment.

March—London, England; motor boat, marine and stationary engine exhibition.

March 1—Fort Smith, Ark., Annual Meeting, Auto Protective Association.

March 1-6—Eighteenth annual automobile show of Buffalo Automobile Dealers' Association, Broadway Auditorium.

March 1-6—Perth Amboy, N. J., First Automobile Show, Auditorium.

March 1-6—Scranton, Pa., Car, Truck and Tractor Show, Armory, Scranton Motor Trades Association, Hugh B. Andrews, manager.

March 1-7—Springfield, Mass., Annual Automobile Show, Springfield Automotive Dealers' Association.

March 1-7—Grand Rapids, Mich., Truck Show, Automobile Business Association.

March 1-13—St. Louis, Mo., First Annual Mississippi Valley Exposition.

March 1-15—Lyons, France, Spring Exposition.

March 2-6—Denver, Col., Automobile Show, Stockyard Stadium, Denver Automobile Trade Association, Harrison Goldsmith, manager.

March 3-6—Lancaster, Pa., Annual Automobile Show.

March 7-13—Muskegon, Mich., Car and Truck, Armory.

March 8-13—Syracuse, N. Y., Annual Automobile Show, Syracuse Automobile Dealers' Association, Howard H. Smith, manager.

March 13-20—Boston, Mass.; Boston automobile and truck show, Mechanics' building; Chester I. Campbell, manager.

March 15—Little Rock, Ark., Automobile Show.

March 17-18—Lake Charles, La., Semi-Annual Convention, Louisiana-Mississippi Automotive Trade Association.

March 19-20—Chicago, Ill., Convention, National Association Motor Truck Sales Managers, Congress Hotel.

TRAIN LOAD SHIPMENTS TO SOUTH.

W. L. Daly, sales manager of the Columbia Motors Co., Detroit, maker of the Columbia Six, states that one of the most striking evidences of the present prosperity of the South is seen in the fact that southern dealers are ordering train load shipments of motor cars. Mr. Daly states that the Columbia Motors Co. has made a number of these quantity shipments lately, and among them was a solid train of 45 freight cars loaded with Columbia Sixes, which went to the Cole Motor Co., Jacksonville, Fla.

Long ago train load shipments ceased to be a novelty in the North, but in the South they mark a new era of prosperity, for such a consignment as that just mentioned means the absorption of over a quarter of a million dollars worth of motor cars at one time by a single southern state having a population of about 1,000,000—more than the average southern dealer could have disposed of in 12 months a few years back.

PIERCE-ARROW'S INDIVIDUALITY.

In maintaining the quality of the Pierce-Arrow Dual Valve Six, the company conscientiously takes advantage of every opportunity to express the owner's individuality in every car, says W. J. Foss, vice president in charge of sales of the Pierce-Arrow Motor Car Co., Buffalo, N. Y.

As a means to this end the company has maintained an art department for 11 years, the assistance of which, with its specially trained staff, is offered to every purchaser of a Pierce-Arrow car. "Because of this department's intimate knowledge of the qualities of tapestries, upholstery, hardware, appointments and paints, the customer has expert guidance in the selection of the materials needed to express his or her tastes," says Mr. Foss. The art department has perfected a unique method of preparing color schemes originated by the company itself or suggested by the customer, by which the appearance of the finished car is clearly visualized.

DEER UPSETS AUTO.

A deer was the cause of a most peculiar automobile accident at Blooming Grove, Pa. Henry Miller was out driving after nightfall in his car accompanied by Miss Anne Seltzer of Hawley. At Blooming Grove Park a deer, dazzled by the lights of the car, rushed out of the woods right upon the running machine, was knocked down and run over. The machine was upset and the occupants pinned beneath.

NEW AUTO SPRING INDUSTRY.

The American Auto Parts Co., with a capital of \$5,000,000, has purchased a tract of 30 acres of land at Detroit on which it is to erect a plant for the manufacture of automobile springs. William E. Perrine is the president and with him are associated several other well known men identified with automotive engineering work.

Polarine

Conserves fuel and develops quiet power

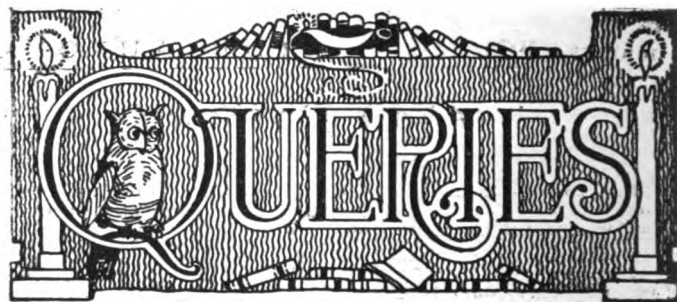
When the going is hard and the engine heats up, Polarine does not run thin and break down. It keeps compression tight and the engine gets every ounce of power out of the gasoline.

Polarine reduces friction to a minimum and lessens the strain on the starting battery. It keeps bearings and engaging parts snug-fitting and operating easily and quietly without racking vibration. Protects against wear and makes motoring pleasanter and less expensive.

Buy Polarine for your engine. Polarine Gear Oil for transmission and differential gears, and power-full, clean-burning Socony Motor Gasoline where you see the red, white and blue Socony Sign.

STANDARD OIL COMPANY
OF NEW YORK

[Principal Offices:]
New York Albany Buffalo Boston



TIMING CADILLAC 1912 VALVES AND BATTERY DISTRIBUTOR.

(M. P., Hamel, Minn.)

Have a Cadillac 1912 model that I cannot start. Have recently had the valves ground, new rings put in and timing gears replaced with new ones. The firing order at present is 1, 2, 4, 3, and want to know if this is correct. The valves seem to open and close properly and there is a good spark at the plugs when the battery ignition is used. The engine does not seem to have much compression when the engine is turned by hand, and it will not start by cranking or with the starter. Kindly give me details in timing this engine and method of putting new gear on the camshaft. Is it necessary to tow a machine that has been overhauled?

Regrinding the valves and putting in new rings should not make any difference in the starting of the car. It would simply weaken the compression for the first few hundred miles till the rings get worked into place and the valves reseal themselves. Your firing order for the cylinders is correct, 1, 2, 4, 3.

In replacing the timing gears that you state were broken, you must have placed them in mesh wrong or disturbed the distributor case driving gears, which drive from the camshaft directly in back of the timing gear, where it is riveted to the camshaft gear flange. If this bevel gear has been changed the timing of the distributor will be changed either late or early, according to which way the bevel gear was moved.

In replacing the timing gears in place, that is the crankshaft and camshaft gears, it will be noticed that they are stamped with the letter "O" on the tooth of one gear and between the teeth at the bottom of the other gear. See that these teeth exactly mesh, with the "O" of one tooth coming exactly opposite the "O" of the second gear. The crankshaft gear can only go on one way, as it is keyed to the crankshaft, while the camshaft gear is riveted. Provision is made so that if the gears meshed properly according to the "O" marks, the valves will open and close at the proper time.

To be sure of this you may check up the balance wheel marks by the valves of No. 1 cylinder as follows: The flywheel is marked "C" meaning center, "IO" meaning inlet opens, "EO" meaning exhaust opens, and "EC" meaning exhaust closed. Each of the above appears twice on the face of the flywheel. When a "C" is exactly at the top of the flywheel it indicates that the crankshaft and piston are on center, that is, that two of the pistons are at their highest points and the other two at their lowest points. The positions of the letters on the flywheel clearly indicate the correct timing of the valves. There being four cylinders, the inlet and exhaust valves must be timed on each separately. As the valves are all timed before the car leaves the factory, these instructions will be found adequate for such slight adjustments as may possibly from time to time be found advisable. For example: Take the forward or No. 1 cylinder: Turn the flywheel in the direction which the engine regularly runs until the inlet valve begins to open. If it is correctly timed, some part of the space between the two lines stamped "IO" will be at the top under the pointer.

If not, the valve should be timed so that it will begin to open when the letters are at the points mentioned. Now turn the flywheel in the direction the engine regularly runs, a little more than half a revolution, when the letters "IC" are at the top. Now take the exhaust valve. This should be so timed that it will begin to open when the line stamped "EC" is at

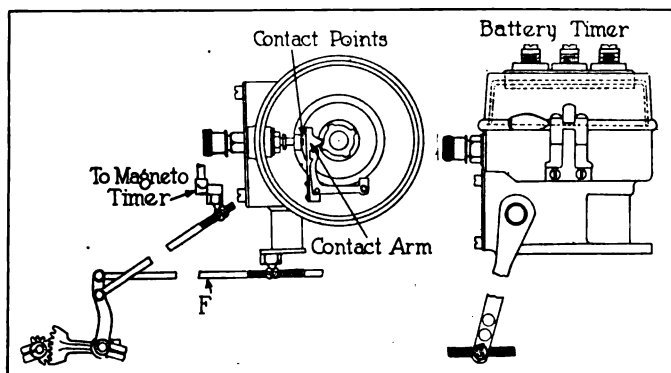
(When Writing to Advertisers, Please Mention the Automobile Journal.)

the top, under the pointer, and should be entirely closed at some part of the space between the lines "EC" on the opposite side as it reaches the top.

It will be noted that the timing of the inlet closing ("IC") and the exhaust opening ("EO") are positive, but that in timing the inlet opening ("IO") and the exhaust closing ("EC") a limit of about $1\frac{7}{16}$ inch on the face of the flywheel is allowed. The adjustments of the inlet and exhaust valves are made by means of the screw in the cam roll slide.

Timing of the valves on the No. 1 cylinder will do for all of the cylinders, for if the valves on this cylinder are correct, the valves on the remaining three cylinders are bound to be correct. If the battery distributor is late or early, it may easily be set correctly as follows: Find the firing center of No. 1 cylinder. This may be determined by opening the air cocks on the cylinders, thus relieving the compression, and turn the flywheel in the direction in which it runs, until the exhaust valve on No. 4 cylinder just starts to close. Then turn the flywheel further in the same direction until the next line marked "C" on the flywheel is directly under the pointer, which is fastened to the crankcase of the engine. Push in the button of the ignition switch on the dash. Retard the spark lever on the steering wheel to its fully retarded position and slowly pull the spark lever forward toward its advance position. Note the point at which the vibrator of the relay will start to vibrate.

If the timer is properly set the vibrator of the relay will start to vibrate before the spark lever reaches "C" on the sector. If the vibrator should start before the spark lever reaches "C" on the sector, it will be necessary to lengthen the rod "F" connecting the timer with the lever on the wheel, where the rod joins the timer case, to correct the adjustment. If, on the other hand, the vibrator should not start to vibrate



until after "C" on the sector is passed, it will be necessary to shorten the rod "F" to correct the adjustment. In making this test always fully retard the spark lever before advancing it. In this way all the slack in the timer and other parts of the spark control mechanism is taken up. Be absolutely sure that the contact points in the battery timer are clean and in proper adjustment, before the rod "F" is adjusted. If the rod "F" were adjusted first, and it was afterwards found necessary to alter the adjustment of the contact points, the setting of the timer would be altered.

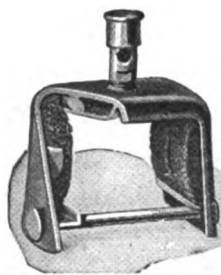
If in removing the camshaft gear, or the battery timer complete, the setting of the two bevel gears, which operate the battery timer, is lost, the gears may be set as follows: Turn engine over until it is on No. 1 firing center and turn further until the center line on the flywheel has passed the pointer six inches.

Hold the control lever K in a fully retarded position and turn the contact cam in the direction in which it rotates by means of the small gear at the lower end of the shaft, until the lobe of the contact cam for No. 1 cylinder (which is the lobe directly behind the keyway, if the contact cam is turned in the direction in which it should turn), just causes the contact points in the timer to come together.

The small bevel gears which operate the timer should be meshed up, holding the timer in this position. After the small timer gears are meshed up and the timer is fastened to the crank as the engine should be turned back to No. 1 firing center, the rod "F" should be adjusted as previously explained.

You ask if it is necessary to tow a machine that has been overhauled to get the engine started. Sometimes this is the only course open when starting an engine in a car that has just had the bearings tightened. No harm can come to the car if the operator uses judgment in starting the engine. The

ENJOY SMOOTH RIDING



by keeping your springs lubricated. Brown Oilers automatically filter oil between spring leaves, eliminate rust, stop squeaks and give you solid comfort.

Easily applied. Ask your dealer. Set of 8 oilers, \$10. Money back guarantee.

BROWN SPRING OILER CO.,
6913 Carnegie Ave., Cleveland, O.



PREVENTS DUST PRESERVES ROADS

Booklets on Request

THE BARRETT COMPANY

New York Chicago Philadelphia Boston
St. Louis Cleveland Cincinnati
Pittsburgh Detroit Birmingham Kansas
City Minneapolis Nashville Salt
Lake City Seattle Peoria



METZ Master Six

The car of the Year

A New England Product

Honest through and through

\$1695 F. O. B. factory FULLY
EQUIPPED

We are now extending our agency list
Information at request

METZ SALES CORPORATION
BOSTON, MASS.

V. A. NIELSEN CO.

708 Beacon Street

Boston, Mass.

We Do Any Electrical Auto-Repairs

Immediate Return Reliable Work
Absolute Guarantee

Factory Depot for
Connecticut Ignition
Dealers' Parts List Ready

N. E. Distributors
Stokes Carburetor
Agents Wanted

MAY WE DO YOUR WORK

PAIGE

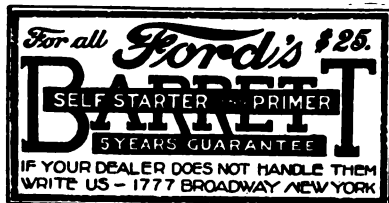
The Most Beautiful Car in America

A complete line
of touring and
enclosed models.

Write for Literature.

Paige-Detroit Motor Car Co.

DETROIT, MICH.



GRANT SIX

You will agree with us that the new Grant epitomizes smartness, comfort and fine engineering. Every mechanical detail measures up to the highest expectations.

GRANT MOTOR CAR CORPORATION
CLEVELAND, OHIO



Giant Searchlight

The highest quality lowest priced
lamp produced.

LIST PRICE With Mirror.....\$6.00
Without Mirror...\$5.00

CULVER-STEARN'S MFG. CO.

Worcester, Mass.
Detroit, Mich.

The Automobile Journal

A QUALITY MAGAZINE, WITH PRESTIGE AND CIRCULATION THAT BRINGS RESULTS TO ADVERTISERS

TIMES BUILDING :: PAWTUCKET, R. I.

best practise is to let the towing car get up a speed of 15 to 20 miles an hour before an attempt is made to start the engine of the towed car. Then place the gear shift in high gear, holding the clutch out as in shifting gears, switch on the ignition and let the clutch in easily, listening to the engine to see if it turns over without unnecessary noise. If unusual noise develops stop and investigate before trying again. After a few trials it can soon be told if it is practical to start the engine in this manner or not. If the bearings have been properly taken up and the reservoir supplied with an over-supply of oil, no harm should come to an engine started in this manner, but if the bearings are too tight, or enough oil is not supplied, untold harm can come to an engine started by towing. In your case we should say that there would be no harm in starting the engine in this manner provided the timing is correct for the valves and the battery distributor.

HIGH AND LOW TENSION MAGNETOS.

(E. B., Providence, R. I.)

Will you please tell me the difference between high and low tension magnetos as applied to ignition? Is the Ford car magneto a high or low tension magneto?

Low tension magnetos as applied to automobiles at present are usually below 20 volts. The Ford magneto may be considered as low tension. Current from such magnetos must be "stepped up" by means of a coil to make it suitable for ignition purposes. The current required for leaping the spark gap in the spark plugs runs considerably over thousands of volts, and the usual method of increasing voltage, which is furnished by the low tension magneto, is by the coil transformer method. This consists of a winding of comparatively coarse wire around a soft iron core. The ends of this coil are connected with the source of current supply, through a suitable vibrator and switch. Surrounding this coil is a larger coil, made up of a great number of turns of very fine wire, the ends of which are connected with the spark plug center and ground respectively. When the low tension current passes through the heavy wire a current is induced in the fine wire of very high voltage, and this current leaps the spark plug gap. Of course it is necessary to apply mechanical means for distributing such current to the proper cylinders, such as timers or distributors. The essential parts to such a system are magneto, coil, vibrator or interrupter and timer or distributor.

High tension magnetos are so designed in most cases as to include the essentials of a low tension system. A high tension magneto contains within itself the necessary windings for generating the current, for stepping it up to the voltage required for the spark plugs and for distributing it to the proper cylinders at the right time. A complete ignition system is a single unit.

INSTALLING LARGER CARBURETOR.

(G. A. G., Woonsocket, R. I.)

I have a Scripps-Booth, early 1915 model, rated at 14 horsepower, equipped with a 7/8-inch Zenith carburetor, and would like to know if it would be an advantage to substitute a one-inch carburetor. What would be the style and make that you would advise me to use?

Also concerning storage battery, I wish to know if it would be advisable to have this battery repaired and if it would give satisfactory results once repaired.

We do not believe that you will be benefited by changing the carburetor on your Scripps-Booth car. While you might get more power at extreme speeds, there would be an unnecessary waste of gasoline at other speeds. It would be very expensive to install a new carburetor, as this change would require in addition a different type of manifold. This change would not be practical, although you might secure more power due to atmospheric conditions in summer, but your trouble would again develop in cold weather.

The Willard people guarantee their work and will advise you as to the condition of your battery.

(When Writing to Advertisers, Please Mention the Automobile Journal.)

The National Auto Shows

Under Auspices of National Automobile Chamber of Commerce, Inc.

January 24-31 AT CHICAGO

Passenger Cars—Coliseum and Armory
Motor Trucks and Highway Transport Conferences
—International Amphitheatre

Take South Side L and change at Indiana Avenue for Halstead Street Station.

S. A. Miles, Manager, 7 East 42nd Street, New York

PURCHASING A USED CAR.

(V. W. J., Lowell, Mass.)

Wishing to buy a second hand automobile and being a new comer to the field, I know that the expression "as is" covers a multitude of sins. Would you please advise me through the "Queries Column" of the Automobile Journal, or by letter, the safest and best way to diagnose this problem satisfactorily to future economy.

Buying a second hand car is not unlike purchasing a cigar, for the quality of either article is not readily visible.

The engine can be fixed, the gears silenced and a new dress of paint will "doll up" the old wagon so that an unskilled purchaser is easily deceived. However, good second hand cars are very hard to get and always command a good price.

Buying a car "as is" from the owner who is purchasing a new car is bad business unless one knows the history of the car, the trials and tribulations it has been through and the amount of care its owner has given it. A car that has been operated a year by a careful owner that has been properly looked after, kept in the best mechanical order and repairs made when needed, is but little inferior to a new one. The bearings will have worn to a good fit and it will have practically more power than one that is new. The value of such a car is usually beyond its second hand price. With a little overhauling and a good job of painting the result will be very satisfactory.

Agencies of new cars take used cars in part payment, overhaul them to some extent but usually sell them with no guarantee. The dealer that makes a business of selling used cars most always overhauls them himself or has it done elsewhere and has a reputation at stake, so his statements regarding a rebuilt car are usually acceptable for their full value.

No matter where the car is purchased it should be gone over very carefully. A demonstration is usually given and this most always consists of a short run around the block and

(When Writing to Advertisers, Please Mention the Automobile Journal.)

perhaps a short spurt up some hill. The performance of the car if it shows power, ease of operation, etc., is sufficient to satisfy the average buyer, but the experienced buyer goes a long ways further.

The engine should be tried out for compression. It should be run at various speeds with an ear towards knocks. The lights and ignition system should be tried out and these questions should be settled: Does the starter crank the engine? Is the oiling system working properly? Take off the gear case cover and try out the various speeds to determine if they click or are sheared off at the corners of the teeth?

Jack up the rear wheels and test for lost motion with the gears in mesh. Pull on the emergency brake to find out if each wheel turns with the same resistance. Rock the wheels to find out if the bearings are worn. Examine the tires carefully. Note the condition of the top, but best of all take an expert mechanic with you and do things up systematically. It will pay you in the long run.

FIRING ORDER.

(F. J. M., Philadelphia, Pa.)

Will you please give me the firing order of the Chalmers 24 car? Also the correct magneto setting? Why is it necessary to have the cylinders fire in a special order?

The firing order of the Chalmers 24 car is 1-4-2-6-3-5. As the camshaft is designed to open and close inlet and exhaust valves in a certain sequence, which complies with above firing order, it will be necessary to connect secondary wires as indicated above.

To set the magneto turn the engine over until the piston has traveled $1\frac{1}{2}$ inches past center on the down stroke of the explosion in cylinder No. 1. Set the spark lever fully retard and mesh the magneto gears at such a point that the breaker points in the magneto are just breaking. The engine should then fire $1\frac{1}{2}$ inches past center. Distributor wires should be connected with plugs in the order above named.



ZENITH CARBURETOR

*All That Its
Name Implies—*

THE HEIGHT OF PERFECTION

You cannot secure more efficient and economical carburetion than by the Zenith. Simplest to adjust, and once adjusted stays adjusted.

Known the world over as the

ZENITH OF CARBURETOR EFFICIENCY

A long list of American builders of cars, trucks and aeroplanes believe this simple, plain tube device to be the best insurance for permanent carburetor satisfaction.

Zenith Carburetor Co.

New York Detroit, U. S. A. Chicago



Monthly

20c the Copy

\$2 the Year

A Tractor Journal
devoted to the
tractor industry and trade

Published by

The Automobile Journal Publishing Company

PAWTUCKET, RHODE ISLAND

(When Writing to Advertisers, Please Mention the Automobile Journal.)

FITTING ROLLER BEARINGS TO FORD FRONT AXLE.

(W. T. W., Rugby, Tenn.)

I recently purchased a set of Timken roller bearings for the front axles of my Ford car and am told that I should use "600 W" oil in them and that the cup grease which I have been using in connection with ball bearings is not suitable for roller bearings. I am also told that "600 W" should be used in differentials. I do not drive my car in winter as roads are impassable. In undertaking to install the roller bearings, without proper appliances, I got the inner roller race stuck on the shoulder of the axle before it was properly seated and cannot remove it or drive it on further, without danger of injuring the race. Was told to apply heat with a blow torch, to expand it, when it was stated the race and rollers could be easily removed.

Kindly tell me through the columns of the Journal how to do this correctly.

The manufacturer of the Timken roller bearings recommends and practically all service stations use a grade of grease somewhat lighter than cup grease for this purpose. The grease is placed on the rolls by hand, the wheel fitted into place on the axle and the outer roll slipped on to the end of the axle after being filled with grease as was the inner roll. Fastening with the washer, nut and cotter pin completes the operation. It is not as necessary to fill the hub cap where roller bearings are used as when ball bearings are employed, but the owner can do as he wishes in this respect, as no harm will be done and no particular good will result from an excessive use of the grease. A roller bearing packed in this manner will require greasing once in every 4000 miles.

If the inner roller is the proper size for the shoulder of the axle, it should slide into place easily without binding. From your description, should say that the bearing was too small. If we are wrong in this, the only recourse that you have, is to drive off the inner bearing, using a piece of hard wood, driving with light blows first above and then below the axle. A block of brass could also be used or a piece of lead, anything soft that will not injure the roller race will do the trick, unless you have the bearing too tightly wedged, which we do not believe is possible. Remove the axle spindle, on which the bearings are to fit. Take it to a machine shop and have a thin shaving removed in the lathe, around the shoulder till the roller sleeve fits easily. Would not advise the use of heat for this purpose as the steel used in the axle and roller is heat treated and hardened and the application of heat will tend to anneal the metal of the bearing and the axle, making it too soft for future use. Still another method of removing the bearing that might be tried is to have a forked iron made at a local blacksmith shop, that will straddle the axle behind the bearing, with the tines of the fork resting against the end of the bearing sleeve. Strike light blows with a hammer as near as possible to the point where the tines of the fork join, using the handle as a means of holding the fork in place and steadying the blows.

Six hundred W is a heavy oil which flows slowly, hangs to the face of gear teeth remarkably well and has come to be used by manufacturers and service stations as a very satisfactory lubricant for units having gears which are designed to run in lubricant. This lubricant is largely used in sliding gear transmission and differentials. This, of course, does not apply to the transmission of your car, as the transmission operates in the same oil which lubricates the engine. In the differential either grease or 600 W may be used with satisfaction, filling the differential case to the filling plug, as this plug determines the height at which the oil in the differential should stand. The case should first be cleaned of the old oil or grease, washed out with kerosene to remove any sediment along with the old grease and filled with the new 600 W oil.

COMPRESSION OF BUICK ENGINE.

(H. R. G., New London, Conn.)

Kindly let me know the compression of a 1916 Buick Little Six engine?

This information you can obtain by writing the Buick Motor Co., Flint, Mich., addressing the inquiry to the "Engineering Department."

CORRECTING RATTLE IN STEERING POST.

(A. M. N., Georgetown, Can.)

I have an old model Ford T car. The steering post rattles at the point where it passes into the steering column. I have tried wedges made of iron and wood, but they drop out. Do you know of any way I can stop this rattle? Would it be practical to bore out only one or two cylinders without boring out the other two or three, or would this result in a jerky action of the engine? Is there any way of filling the scratches in the cylinders? Is there a manufacturer making a compound which is introduced into the intake manifold for filling up such scores?

There is no adjustment for taking up the steering post at the point you mention. The rattle at the point you speak of may be caused by the spark rod, the throttle rod, or the steering post. Bend a piece of spring brass or steel into the shape of a letter "S" and put one end around the spark rod, thread it under the steering post, then back over the throttle rod. The tension of the spring should keep the three from rattling.

We would not suggest boring out one or two of the cylinders in the engine without boring out the whole four, as the result might be, as you suggested, an uneven running engine. The best plan would be to bring out the scratches and replace the piston rings with rings which you may obtain up to .020 of an inch oversize.

There are a number of manufacturers that claim to repair scored cylinders by a plating method.

We do not know of any compound which may be introduced into the intake manifold to fill up scratches in the cylinders.

SQUEAK IN GENERATOR.

(G. F. R., Perth Amboy, N. J.)

There is an annoying squeak in the generator of my Oldsmobile 1917 model No. 45, the noise caused, I believe, by the commutator.

Two different garage mechanics have lightly used fine sandpaper and emery paper on the commutator, which eliminates the squeak for a very short time. I drove the car over 100 miles yesterday and the noise was aggravatingly in evidence for most of the time.

Can you determine the trouble if it is other than the commutator and in any case advise as to a permanent remedy?

This noise is probably due to one or more of the commutator brushes. Try lifting off one brush at a time (providing this does not open the circuit). Find the brush which makes the most noise and readjust the tension, seeing that the brush holder allows for proper play. Apply a little vaseline with the finger to the commutator while running. Be sure that brushes are set at correct slant for the direction of rotation of the armature and that they fit the curvature of the armature. This curvature can be obtained by holding a strip of sandpaper firmly on the armature and turning the armature back and forth, letting the sandpaper wear down the brush. The brushes on a new car always squeak more or less at first, but this should stop after running a day or two.

Use a fine grade of sandpaper, but never use emery cloth for the dust and particles from this combination are liable to get into the segments and pores of the copper, thus eating their way to serious damage.

MANUFACTURER'S ADDRESS.

(C. J. S., Hartford, Conn.)

Will you kindly send me the address, if possible, of the manufacturer of the Grant-Lees clutch.

The Grant-Lees Gear Co., 2367 East 69th street, Cleveland, O., manufactures a complete line of transmission gears for passenger cars and trucks and we presume that they manufacture the Grant-Lees clutch. If you drop them a line we feel sure that they will gladly give you the desired information.

(When Writing to Advertisers, Please Mention the Automobile Journal.)

**NOW IS THE TIME**

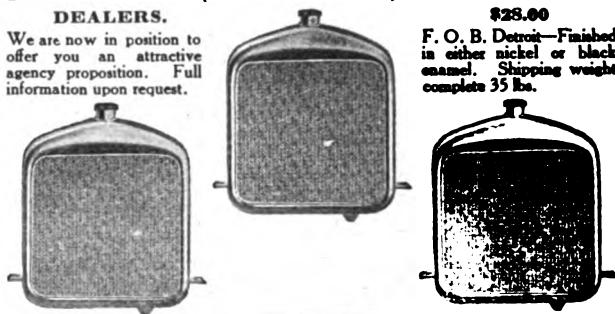
NATIONAL Zig Zag Radiator equipped—your Ford will win the approval of all who see it. From an appearance standpoint the improvement is marked. Far more important and satisfying, however, are the mechanical results heretofore unknown to a Ford. Smooth operation—more comfortable riding—at an actual saving in gasoline and oil, appeals when you are the recipient. National Zig Zag principle of greater circulation cooling capacity make these things possible. Severe winter weather annoyances are combated in National Zig Zag Radiators by extreme expansion and contraction flexibility. Each day's delay lessens the real enjoyment possible with your Ford. Now is the time to order one.

*Let us put you in touch with our nearest dealer.***NATIONAL CAN COMPANY**
DETROIT (Radiator Division) MICHIGAN**DEALERS.**

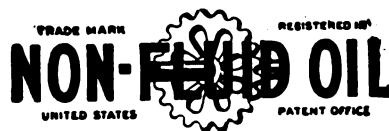
We are now in position to offer you an attractive agency proposition. Full information upon request.

\$28.00

F. O. B. Detroit—Finished in either nickel or black enamel. Shipping weight complete 35 lbs.

**NATIONAL ZIG ZAG RADIATOR**

Fill Grease Cups Now For the Winter with



won't harden with cold
or non use—makes winter
lubrication as satisfactory
as summer.

Use "K-00 Special Grade" for Gears

"K-000" for all bearings

New York & New Jersey Lubricant Co.**165 BROADWAY, NEW YORK**

COES *The Standard* WRENCH



WRENCHES that are made for the hardest service. They do not break but grip and hold and their efficiency never lessens.

Economy tools as they last longer, give better service and never become useless through wear.

Utility wrenches of the highest order for car owners and repairers as they can be used in compact places and once set hold like a vise.

*The Best Wrench
The Cheapest*

All dealers carry in stock the exact size to meet your need. They recommend Coes Wrenches as all good dealers have for more than fifty years.

COES WRENCH COMPANY
WORCESTER, MASS.

BACK FIRE IN MUFFLER.

(P. Y. H., Yonkers, N. Y.)

I have a 490 Chevrolet, 1917 model car, and am troubled with explosions in the muffler, or back fire. If I quickly remove my foot from the accelerator the explosion occurs. What is the cause of this and how can it be remedied? If you advise me on these points I would appreciate.

Muffler explosions are attributed to the fact that in the muffler is an unignited charge from a previous stroke of the engine where the charge has not been fired in the cylinder. This trouble may be traced to a number of things, such as the mixture being too rich, from electrical troubles, weak batteries or a poorly adjusted coil.

There must always be a sufficient flow of gasoline into the carburetor. Too late a spark and an open throttle will cause back firing. Examine the auxiliary air valve and see that it does not open on low speeds. If the spring is too weak it will give trouble. Perhaps the valves are not timed correctly. If the mixture burns too slowly it will operate the same way and will fire itself. Are you sure that your inlet valve does not open before the closing of the exhaust valve?

See that there is no dirt in the spray nozzle of the carburetor, open the gasoline adjustment and race the motor and it will put through if this is the case. Try feeding a little more gas and if this does not remedy the trouble, look for carbon deposits. Back firing means that the mixture is burning on both the inlet and exhaust strokes.

QUESTION OF HORSEPOWER.

(J. G., Erie, Pa.)

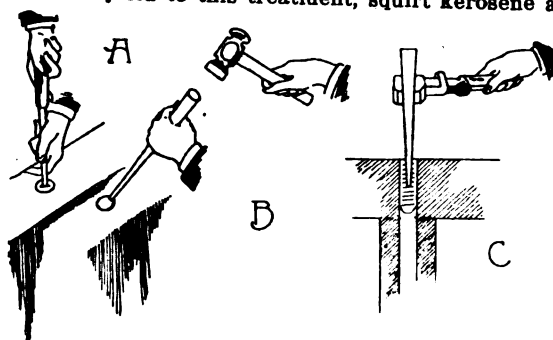
Which has the more real horsepower, an Oakland Sensible Six Model 34B or a Maxwell Model 25 1917?

The 1918 Oakland Sensible Six Model 34B, six cylinders, has a bore of 3 13/16 inches, stroke 4 1/4 inches, registers 19.7 and actually develops 44 horsepower on block test. While the Maxwell 1917 Model 25, four cylinders, bore 3 5/8 inches, stroke 4 1/2 inches, registers 21 horsepower and actually develops on block test 37 horsepower.

According to the registered horsepower the Maxwell shows the higher horsepower, while the block test shows that the Oakland actually develops the greater power by several horsepower.

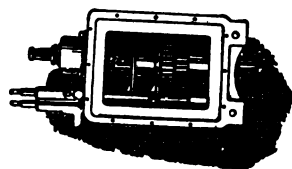
REMOVING BROKEN STUDS.

The best way to extract a broken stud is to make a slot across the face of the bolt with a cold chisel and use a screw driver to turn the broken part out, as shown herewith at A. If it does not yield to this treatment, squirt kerosene around



Three Ways of Removing Broken Studs.

the threads and then tap close to the edge of the bolt with a taper point chisel and hammer, as shown at B. If it still resists, apply heat to the surrounding metal and apply the chisel and hammer again. If this method fails it will be necessary to drill a small hole in the center of the stud and then drive in a four-cornered wedge-shaped punch. Apply a wrench to the top of the punch, as at C, and turn in an outward direction. The last resort is to drill out the part, using a drill which is the body size of the tapped hole, after which the hole should be tapped for the entire length. Care should be taken to start the drill directly in the center of the broken stud.



DIXON'S
GRAPHITE
Transmission and Differential
LUBRICANT

The surfaces of the gears in your transmission are like fine sandpaper—so fine that you can't see the rough spots without a microscope—but formidable enough to be a serious menace to the life of the whole transmission unless properly guarded against.

And that is the chief duty of Dixon's Graphite Transmission and Differential Lubricant.

The graphite in this lubricant "fills in" between the high spots—and stays there—making a permanently smooth slippery surface, impossible to obtain in any other way.

Write for Booklet No. 210-G.

Made in Jersey City, N. J. by the
JOSEPH DIXON CRUCIBLE COMPANY
Established 1827



NEW DEPARTURE BALL BEARINGS



Strength
Stamina
Service



The New Departure Manufacturing Co., Bristol, Conn.
Conrad Patent Licensee

(When Writing to Advertisers, Please Mention the Automobile Journal.)



WONDERFUL POWER

The dealer who sells Allen cars has an exceptional franchise.

He represents a car that upon demand will deliver more power than anything hitherto produced in Allen's field.

On hills, he can outdemonstrate all cars in this class, and can often out-point many larger and more expensive cars.

He can prove, by tangible records, that this new Allen is one of the most durably serviceable cars built.

He can present Allen in any company and be proud of its clean lines and fine appearance.

Today, an Allen dealership is a valuable business asset, the worth of which is constantly increasing.

The ALLEN MOTOR COMPANY, Columbus, Ohio, U. S. A.
See the New Allen at the Boston Show.

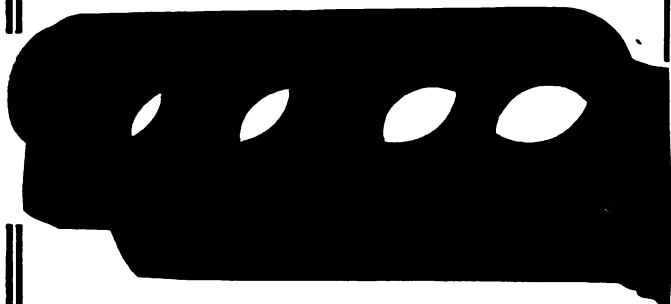
Copyright 1920 The Allen Motor Co.

(When Writing to Advertisers, Please Mention the Automobile Journal.)



A Badly Scored Piston.

Notice this black spot around the wrist pin hole, caused by the hot gases blowing down the score grooves.



Three cylinders of this block are deeply scored, while the surface of the fourth is in good condition.

50% More Power Added To Your Motor

When your car or truck is steadily losing power, smokes badly and uses a lot of oil, although you know the valves are tight, ignition and carburetor are right, the chances are nine out of ten the pistons and cylinders are scored or badly worn. There is one, sure, positive method of making the motor as powerful as when new.

Regrinding the Cylinders and Installing New Pistons

We operate continually five standard manufacturers' type grinders and carry a large stock of castings.

Guaranteed satisfaction. Prompt service.

You are cordially invited to call at
Booths 445-446, 20th Boston Auto Show.

Cambridge 6767-6768

G. H. Dyer Co. Cambridge, Mass.
155 Brookline Street.

AUTOMOBILE JOURNAL INDEX TO ADVERTISERS

	Page
Allen Motor Co.....	1
Atwater Kent Sales Co. of N. E.....	101
Bancroft Tire Co.....	103
Barrett Co., The.....	109
Barrett Motor Starter Manufacturing Co., Inc.....	107
Boston Auto Show.....	4
Boston Auto Tire Exchange.....	102
Boston Retread Tire Co.....	101
Brightman Auto Exchange.....	101
Brown Spring Oiler Co.....	109
Champion Shock Absorber Sales Co.....	102
Coe's Wrench Co.....	109
Connecticut Auto Parts Co., Inc.....	101
Cormack Co.....	102
Culver-Stearns Manufacturing Co.....	107
Detroit Radiator & Specialty Co.....	101
Dixon Crucible Co., Joseph.....	105
Dort Motor Car Co.....	5
Dover Stamping & Mfg. Co.....	105
Dyer Co., G. H.....	2
Engle Oil and Supply Co.....	6
Evans-Lawrie Co.....	111
Fitzgerald Mfg. Co.....	94
Flaherty, Wm. H. Co.....	102
Ford Mica Co.....	10
Furber Mfg. Co.....	95
Gates Rubber Co.....	9
Gartley Weston Co.....	12
Grant Motor Car Co.....	105
Grow Tire Co., Geo.....	11
Gulf Refining Co.....	3
Ideal Tire & Rubber Co.....	13
India Tire & Rubber Co.....	Cover
Jackson Motor Service Co.....	102
Lawson Co., F. H.....	109
Liberty Tire Co.....	101
Madison Tire & Rubber Co.....	Cover
Magneto and Generator Exchange of N. E.....	102
Magneto Shop.....	102
Masters Mfg. Co.....	97
Mets Sales Corporation.....	56A-B-C-D
National Can Co.....	111
New Departure Manufacturing Co.....	109
New York and New Jersey Lubricant Co.....	111
Nielsen Co., V. A.....	105
Northwestern Chemical Co.....	16
Palge-Detroit Motor Car Co.....	109
Paterson Co., W. A.....	7
Pierce-Arrow Motor Car Co.....	Cover
Schrader's Son, Inc., A.....	14
Standard Oil Co. of N. Y.....	107
Strandway Auto Parts Co.....	101
Syracuse Rubber Co., Inc.....	Cover
Thomas-Armstrong Co.....	98
Vacuumeter Sales Corp.....	100
Walden Worcester, Inc.....	99
Waltham Watch Co.....	96
Wetmore Savage Co.....	93
Zenith Carburetor Co.....	8

(When Writing to Advertisers, Please Mention the Automobile Journal.)



At the sign of the orange disc

THERE are no "carbon-less" motor oils. Petroleum is a Hydro-carbon product and it is impossible to extract the carbon. Neither is it possible to prevent a portion of the oil from working up into the combustion chamber. Hence, there is sure to be more or less carbon deposited.

Supreme Auto Oil *Leaves Less Carbon*

in the combustion chamber, as it contains no paraffine—most of the free carbon is blown out with the exhaust.

Paraffine forms a gummy substance which collects and holds the carbon, allowing the extreme heat to harden it upon the piston head. A great deal of trouble may be eliminated, therefore, by the use of SUPREME AUTO OIL.



Look for the
Sign of the Orange Disc

GULF REFINING COMPANY

General Sales Offices: Pittsburgh, Pa.

DISTRICT SALES OFFICES:

New York
Atlanta

Philadelphia
New Orleans

Boston
Houston

(When Writing to Advertisers, Please Mention the Automobile Journal.)

BOSTON AUTOMOBILE SHOW

MECHANICS' HALL

Huntington Avenue

SOUTH ARMORY

Irvington Street (Auspices of Y-D Club)

MARCH 13-20

10 a. m. to 10:30 p. m. daily

Opening Day, at 2 p. m.

***The Largest Automotive Show Ever
Organized In America***

90 Makes of Passenger Cars

68 Makes of Trucks and

300 Exhibits of Accessories

***Combination Exhibition in Each Building,
One Ticket Admits to Both***

Magnificent Decorations

Band and Orchestral Concerts

Personal Direction of Chester I. Campbell

(When Writing to Advertisers, Please Mention the Automobile Journal.)

DORT

Quality Goes Clear Through

Each succeeding Dort that goes into use provides fresh data as to the marked durability of the car and the thrift with which it operates.

And so, to each new owner can be traced directly the responsibility for further Dort sales in his locality.

For the sincere satisfaction he finds in his investment has an obvious and definite influence upon the decision of his neighbors when they make their selection of a car.

At the Boston Show

PRICES

Effective Feb. 15

Touring Car	-	-	-	\$1035
Roadster	-	-	-	1035
Fourseason Sedan	-	-	-	1665
Fourseason Coupe	-	-	-	1665

F. O. B. Factory

Wire wheels and spare tires extra

(211)

DORT MOTOR
CAR COMPANY

Flint Mich.



Utterback-Gleason Co.

*Distributors for New England
and Eastern New York*

Boston Albany Bangor

(When Writing to Advertisers, Please Mention the Automobile Journal)



When Service is a Business Proposition

Economy in operation, saving in time, repair and upkeep costs are the easiest profits earned. Eagleine Motor and Gear Oils will add to motor efficiency and economy because they are produced to a quality that guarantees complete lubrication and affords greater mileage on a given amount of oil.

Eagleine Motor Oils do not soot. They carbonize less than any other lubricant. No engine attention in 10,000 to 20,000 miles usage is common service among Eagleine users. This means constant service and added revenue and

a vehicle always available when needed.

Eagleine Motor and Gear Oils are the proper lubricants for transmission and differential gear sets. Unlike grease, this gear oil will not solidify, but forms a cushion that covers and protects the gears. Its efficiency is good to the last drop. Its economy is in the saving of parts, undue wear and repair bills.

Sold by all good dealers.

Specify Eagleine Motor or Gear Oils. Look for the Eagleine trade mark.

Eagle Oil and Supply Company

44-46 India St.,

NEW YORK CITY
Woolworth Building

Boston, Mass.

CHICAGO
1232 W. 37th Street

Paterson SIX

Out Of The Price Class

Yet it costs no more. That is the expression of the Paterson ideal and the Paterson policy.

The standards of the W. A. Paterson organization do not permit blind following of blind leaders—we create, without regard to price competition, and prospective car buyers probably think less of the dollar sign when viewing the Paterson Six than they do in considering any other car.

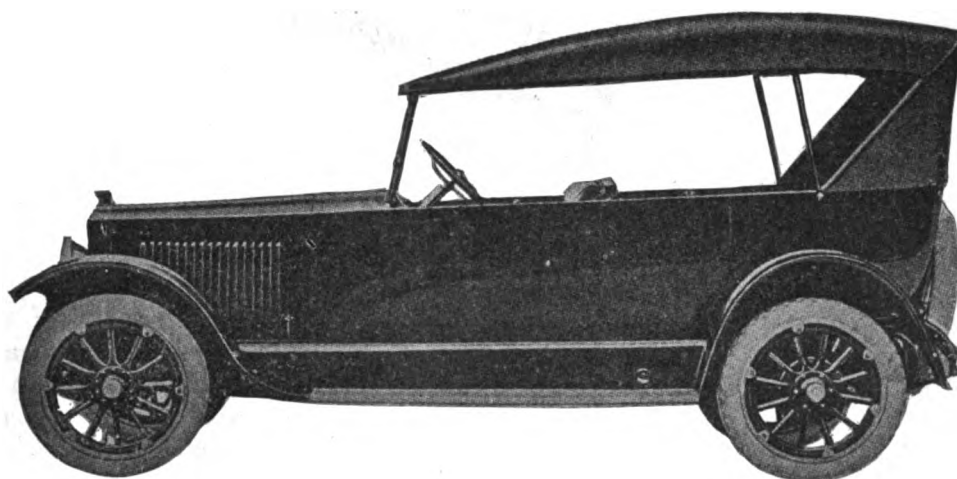
The Paterson Six is a finer value—obviously it is so much more desirable a purchase than others in its price class that buyers are agreeably surprised when they sign the dotted line to find that the price of the car is so modest.

The body is a masterpiece of the builder's art—the product of craftsmen. Long wheelbase permits full comfort. The flow of the smooth-blending lines creates pride of ownership. The color choice permits of artistic self-expression by the discriminating buyer. The standard, use-approved specifications completely satisfy the mechanically wise, and give point and justification to our claim that the Paterson Six represents a finer motor car value.

*Substantial companies are invited
to correspond with us*

Price \$1795

W. A. Paterson Co., Flint, Mich.



(When Writing to Advertisers, Please Mention the Automobile Journal.)

ZENITH



A revised edition of this instructive and valuable book on Carburetion is now ready. *A copy will be sent on request.*

ZENITH CARBURETOR COMPANY

New York

DETROIT

Chicago

(When Writing to Advertisers, Please Mention the Automobile Journal.)

Direct the Belt-Buying Habit to Your Store —



by Carrying a Complete Line

Every motorist who comes into your store buys Fan Belts—do you sell all of them?

If you will make an actual check before you answer this question, you will be surprised.

Unless you are carrying a "standardized" line of Flat and V Belts, you are not getting more than 60% of the possible business—40% of your customers are buying their belts elsewhere.

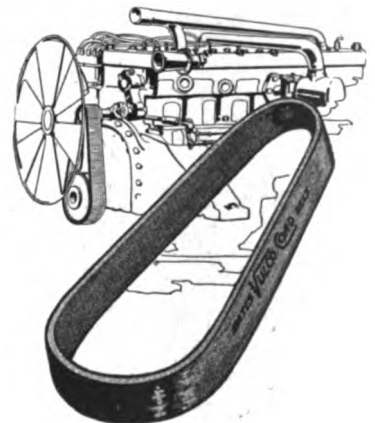
This 40% of the Fan Belt business

is profitable and you should get it.

The Vulco Cord is the only "standardized" Fan Belt line—both flat and V shaped—that's why more than 100,000 Dealers are now selling it exclusively.

Don't overlook the extra profit that a 100% belt line will earn for you.

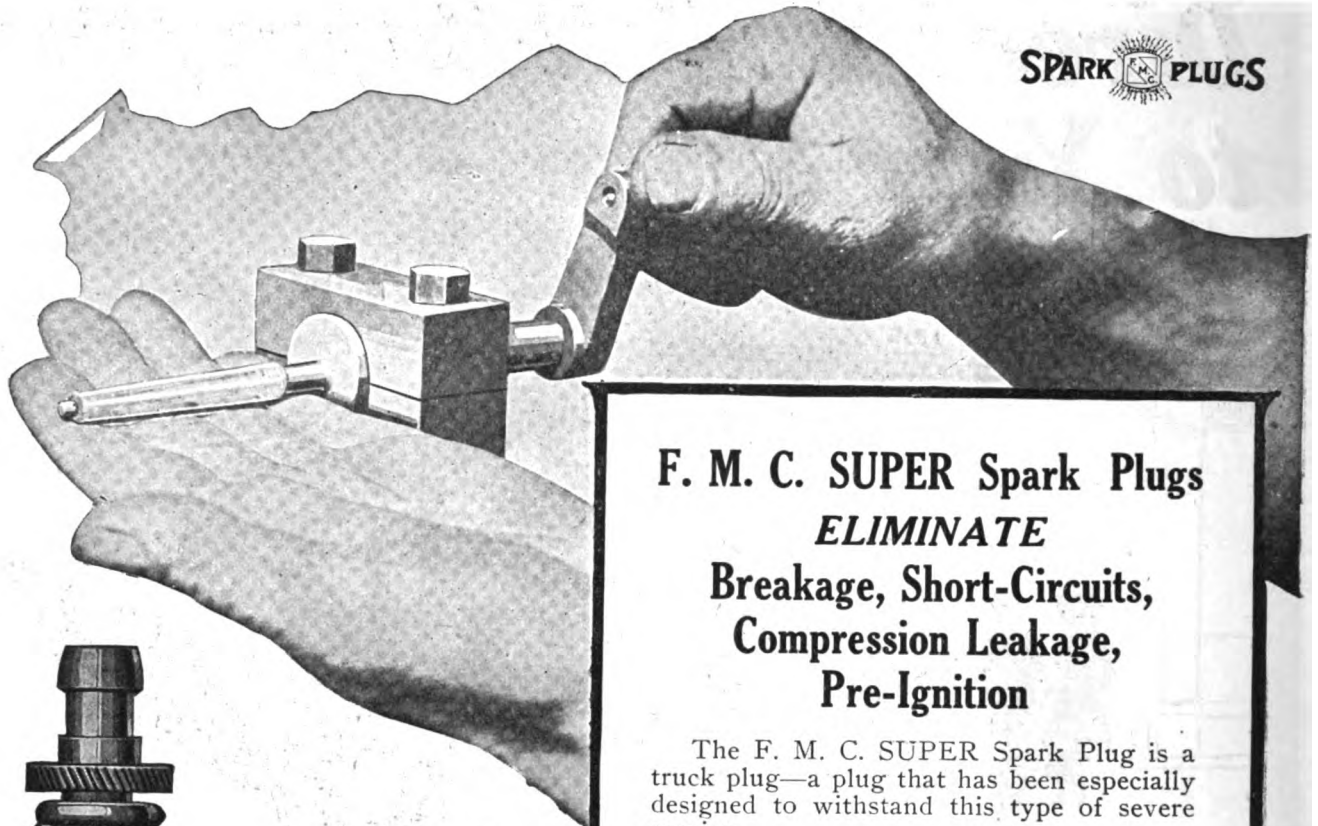
Insist upon the "standardized" belt—the Vulco Cord Belt. Your jobber stocks it. Ask him for it.



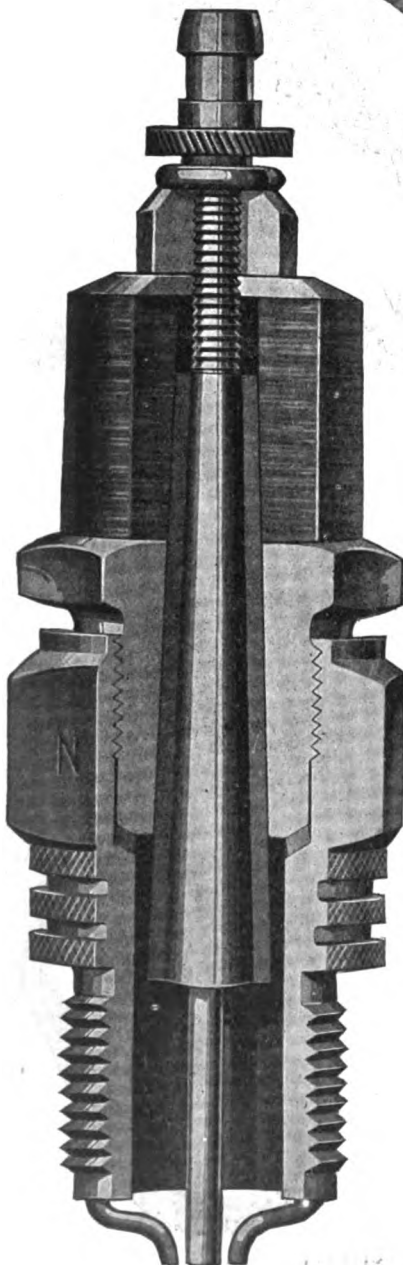
GATES VULCO-CORD BELT
"The Standardized Fan Belt"

Made by **GATES** Denver
 Rubber Company

(When Writing to Advertisers, Please Mention the Automobile Journal)

Wrapping the
core with mica



F. M. C. SUPER Spark Plugs

ELIMINATE

Breakage, Short-Circuits, Compression Leakage, Pre-Ignition

The F. M. C. SUPER Spark Plug is a truck plug—a plug that has been especially designed to withstand this type of severe service.

It is insulated with the best ruby Brazilian Mica, making the plug short-circuit proof and practically indestructible.

The conical shape of the center electrode and the soft copper gasket between the two parts, make compression leakage impossible.

Pre-ignition trouble has been eliminated by insuring a rapid radiation of heat through the use of knurls and a large radiating surface.

F. M. C. SUPER Spark Plugs will last the life of a car or truck.

*Ask Your Dealer To Show
You This SUPER Spark Plug*

Price \$2.00 and Worth It.

For Sale by Leading Dealers

Made by the
FORD MICA CO., Inc.

Exhibiting at Boston Show—Booth 881A.

14 Christopher St.,
New York, N. Y.

THE
F M C
SPARK PLUG

(When Writing to Advertisers, Please Mention the Automobile Journal.)



GEO. GROW TIRES

DEALER CONTRACTS

Are open for some especially desirable territory. [We want the highest grade representation. We have a sales proposition that can be made extremely profitable.

We manufacture Geo. Grow tires at one plant at Canton, Mass., equipped with every facility for perfected production, manned by expert workers.

No better tires can be made. The quality can be judged by comparison of product and service record.

The series includes both fabric and cord tires, all non-skid, and they are oversize, though marked regular, which insures maximum mileage and lessens the cost.

These tires are sold at our sales rooms in Boston, and at branches in Providence, Manchester, N. H., Portland, Me. and Lynn. The demand has been such that to keep pace with it our dealer organization must be perfected.

Let us explain our sales contract and quote you prices and discounts. We will be limited by production capacity and prior contracts. Write or wire.

GEO. GROW TIRE COMPANY.

Main Office: 323 Columbus Ave., Boston, Mass.

Factory: Canton, Mass.

Branches:

Providence, R. I.
67 Empire Street.

Manchester, N. H.
1134 Elm Street.

Portland, Me.
656 Congress Street.

Lynn, Mass.
176 Broad Street.

(When Writing to Advertisers, Please Mention the Automobile Journal.)

Weston Auxiliary Windshields

*You buy them for looks—
but quickly see their utility*

Winter or summer they have their advantage. In the cold period they keep the wind and sleet, rain or snow off the occupants of the car. No more cold gusts of wind blowing across the face or around the neck—causes of chapped face and stiff necks and colds.

In summer they keep out the rain, dust and warm air. A utility as well as adding to the appearance of your motor car.

Made of the best grade of heavy plate glass—highly nickled, heavy brass fixtures—movable in all directions. Nothing cheap about them except the price.

Easily adjustable—movable in all directions—will not rattle. A distinctive style for each motor car. Does not interfere with spotlight or side curtains. Gives 10 inches more wind deflection on each side of car.

Price \$25 a set



*Creative Designs
Engraved on the
Glass—Write Us
About It*

*Distributors Territory
Now Being Allotted—
A Telegram Will Bring
Details or a Represent-
ative.*

GARTLEY-WESTON COMPANY

Manufacturers of Automotive Accessories

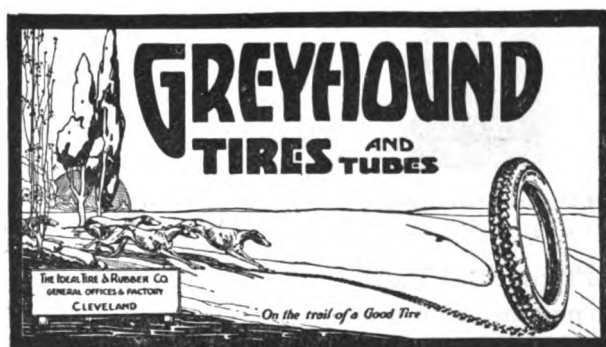
Real Estate Exchange Building

Detroit, Michigan, U. S. A.

The Ocean Greyhound is recognized the world over as the paramount of strength and durability.

GREYHOUND TIRES

hold the same high position in the minds of all users of Quality Tires.



(When Writing to Advertisers, Please Mention the Automobile Journal.)



Kwik-on-an-off
TRADE MARK

INSTANTANEOUS

At last a dust cap that you don't have to keep on turning forever to put on.

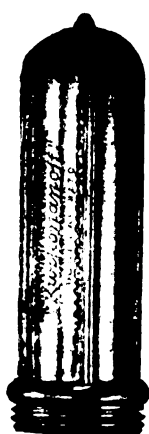
Slip it over the valve-stem and give one turn and it's on.

When you want it to come off—and not till then—one turn in the other direction unlocks it.

Simple, Expeditious, Unfailingly Efficient and Inexpensive

You can be sure that with

**SCHRADER UNIVERSAL
Kwik-on-an-off**



dust caps on your valves, dust and dirt will not get to the valve-cap or inside the valve-stem thereby causing damage to the valve-inside and occasioning a leak.

at your dealer or

A. Schrader's Son, Inc.
Brooklyn, N. Y.

Pat. Dec. 24th, 1918

Pat. Sept. 9th, 1919

Price 50 Cents
per set of four

(When Writing to Advertisers, Please Mention the Automobile Journal.)

AUTOMOBILE JOURNAL

INDEX TO CONTENTS

Published Monthly by the
AUTOMOBILE JOURNAL PUB. CO.
Times Building, Pawtucket, R. I.

WILLIAM H. BLACK.....Treasurer
DAVID O. BLACK.....Secretary

Branch Offices: New York City, Chicago, Detroit,
Boston, St. Louis, Cleveland.

SUBSCRIPTIONS:

United States and Mexico (Postage Paid) the year \$1.50
Canada\$2.50
Foreign Countries in Postal Union.....\$3.50
The Copy.....20 Cents

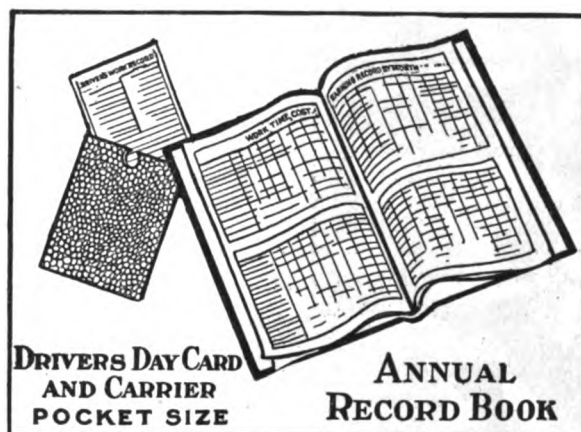
PARTIAL LIST OF CONTENTS

	Page
*Boston Show Will Maintain International Prestige..	17
*Distinctive Feature of New Cars to Be Seen at Boston	23
*Important Records Made in Racing Events.....	33
Dodge Car Operating Alaskan Railroad.....	34
*Engine Trouble Prevented by Foresight.....	36
*Care in Washing and Cleaning Car Necessary.....	37
*Trailmobile Co. Builds New Plant.....	38
*How Weather Bureau Aids Autoists.....	40
*Automobile Dealers' Associations.....	42
Protecting Car When Not in Use.....	44
Operation of Car in Cold Weather.....	45
Calendar of Coming Events.....	47
7,691,523 Motor Cars Registered Jan. 1.....	48
*Monthly Wiring Diagram, No. 2.....	65
*Efficient Water Circulator for Ford Engine.....	66
*Handy Home-Made Set of Tools for Removing Broken Studs.....	67
Mechanical Hints for Repair Shop and Garage Man	68
Business Booming for Body Builders.....	69
*Tire Industry and Trade.....	70
*Running the Car on Low-Grade Fuel.....	72
Proper Care of Top and Upholstery.....	73
*New Accessories.....	74
*Cadillac's Modern Plant Consists of Eight Units..	80
Official Roster National Automobile Chamber of Commerce	81
*Universal Automatic Re-Carburetor.....	83
Directory of Passenger Car Manufacturers.....	84
Passenger Car Specifications.....	86
*Wetmore-Savage Co. Makes Phenomenal Growth..	90
*New Booty Vacuum Carburetor.....	92
*Humorous Side of Motoring.....	104
*Practical Hints on Vulcanization and Care of Tires	106
Export Department.....	108
*Signs for Safeguarding Grade Crossings.....	110
*Furber 100 Per Cent. Spark Plug.....	112

*Indicates That Article Is Illustrated.

Know what it costs to Run your Truck
Learn what your Truck Earns
Know your Truck Profit and Loss

UNIVERSAL MOTOR TRUCK ACCOUNTING SYSTEM



The system includes an annual record book, 350 drivers' day cards, a day card carrier and full instructions.

Any owner can start this system at any time with an old or new truck of any make or type.

Any boy or girl clerk can maintain all records for one or a hundred trucks.

Each system is good for one year, nothing more is needed or necessary.

The records show at a glance any and all items entering into the earnings and cost of operation.

It is extremely simple. 100% complete and full working instructions are supplied with each system.

It is almost self-operating.

Price \$10 — Delivered

Address Record Department

MOTOR TRUCK

Pawtucket, Rhode Island.

Jobbers Who Witnessed This Test

S. K. WALLACE, G. Norman Baughman Co., Tampa, Fla.
 A. J. HOPKINS, Canadian Fairbanks-Morse Co., Limited, Montreal, Quebec.
 E. V. PLANE, Carolina Tire & Accessory Co., Inc., Columbia, S. C.
 G. B. SHEARER, Gaul, Derr & Shearer Co., Philadelphia, Pa.
 J. N. WHITE, Ferris-Dunlap Auto Supply Co., Dallas, Texas.
 A. A. WAYS, Ferris-Dunlap Auto Supply Co., Dallas, Texas.
 A. J. JOHNSON, I. J. Cooper Rubber Co., Cincinnati, Ohio.
 J. G. FITZSIMMONS, Carolina Auto Supply House, Charlotte, N. C.
 W. H. VAN HORN, Pennsylvania Rubber & Supply Co., Oil City, Pa.
 F. HAMILTON SUTER, Shadboldt & Boyd Iron Co., Milwaukee, Wis.
 DUNBAR ABSTON, Ozburn-Abston & Co., Memphis, Tenn.
 W. JUSTICE, Robinson Heavy Hdwe. Co., St. Joseph, Mo.
 TROY B. WILDERMUTH, Front-Market Motor Supply Co., Harrisburg, Pa.
 H. B. SMITH, Pennsylvania Rubber & Supply Co., Cleveland, Ohio.
 H. T. SCHLEININGER, Motor Car Equipment Co., New York, N. Y.
 M. SHAPIRO, Gaul, Derr & Shearer Co., Philadelphia, Pa.
 W. F. FERRIER, Fred Campbell Auto Supply Co., St. Louis, Mo.

With 17 Jobbers as Judge and Jury

Before a recent gathering of representative Auto Supply Jobbers in Marietta, Ohio, SE-MENT-OL Liquid was poured into a radiator that spurted water from several leaks. While the jobbers (names listed above) watched closely, SE-MENT-OL sealed every leak in less than ten seconds.

The permanency of SE-MENT-OL repairs was proven when a can, in which several leaks had been Se-Ment-Ol sealed, was thrown time and again down a flight of concrete stairs, the can being demolished before a single leak opened up.

These tests with SE-MENT-OL and other Norwesco products, were filmed and will be shown soon throughout the country, through the courtesy of jobbers.

The Northwestern Chemical Co.

722 State Street, Marietta, Ohio, U. S. A.

Canadian Factory: Montreal.

Retails at 75c, Liquid or Powder.

Write for Dealers Proposition.

SE-MENT-OL

The Radiator Repairer Guaranteed
For the Life of the Car

(When Writing to Advertisers, Please Mention the Automobile Journal.)

THE AUTOMOBILE JOURNAL

VOL. LXVII.

PAWTUCKET, R. I. FEBRUARY, 1920.

NO. 7.

Boston Show Will Maintain International Prestige

Biggest Automobile Exhibition of Season Promised at Mechanics' Building for Week of March 13--20

THAT the 18th annual Boston automobile show, which will open at 2 o'clock Saturday afternoon, March 13, in the Mechanics' building, will easily maintain its international prestige as the greatest exhibition of its kind in the world, there is not the slightest shadow of a doubt.

According to the latest reports given out by the managers, it will exceed the New York and Chicago expositions of this year in number of passenger car exhibitors by at least five, and these will include 12 new makes never before shown, and the number of commercial vehicle displays will equal, if it does not overrun, those at the two metropolitan shows. And in regard to accessories, when it is stated that this department will surpass by at least 100 the maximum number ever seen at Boston, the



Chester I. Campbell, General Manager
Boston Automobile Show.

represent the immense enthusiasm and unbounded interest with which the project has been received this year by dealers and manufacturers in all branches of the automotive industry, unless they are considered in conjunction with the statement made by the managers that for the past 2½ months applications for space have been repeatedly refused and that even after by repeated rearrangements of all allotments and utilization of all possible spare floor space with the object of accommodating additional exhibitors, the number of displays might easily have been increased by at least 100 had there been any more room available.

It should, too, be remembered, in gauging the magnitude of this 1920 Boston show that 40,000 additional feet of floor space has been added this year by overflowing into the South Armory in Irvington street.

In fact, it is not too much to affirm that never before in the history of the

automotive activities of this or any other country has there been collected under one management and at one time such a comprehensive exposition of all phases of these allied industries, including not only whatever has become standardized by years of designing and manufacturing experience not forgetting the utilitarian influence of the period of war vicissitudes which the industry has so successfully overcome and the effect of which is still markedly manifest in the year's offerings, but also presenting, in a most graphical way, whatever the past season has developed in the most novel, luxurious and up-to-date refinements in design, equipment and furnishings.

This Year's Exhibits.

The latest revised figures given out by the management indicate that 90 differ-



J. H. MacAlman, President Boston Automobile Dealers' Association.

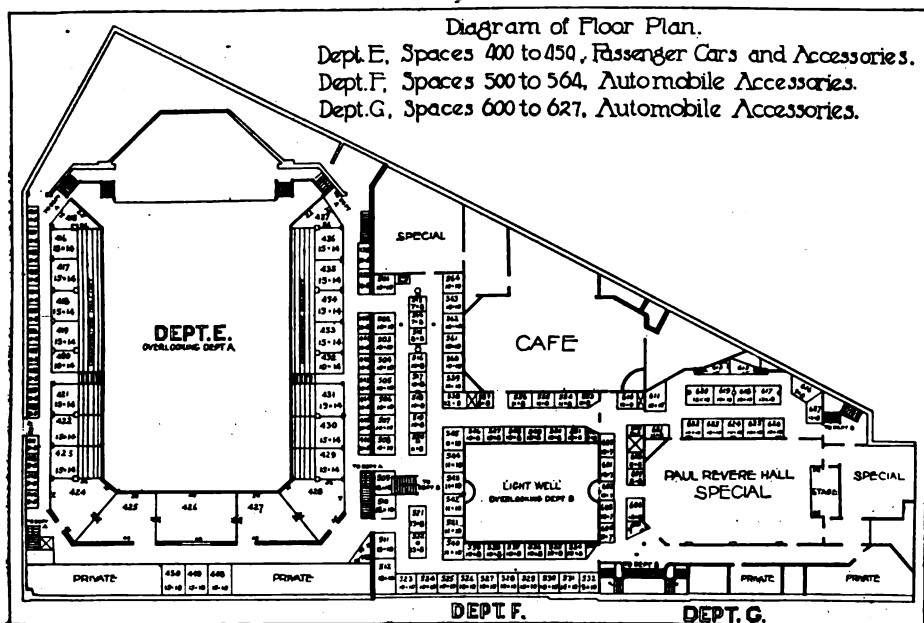
comprehensiveness of this section can well be imagined.

And these figures do not adequately



J. A. Hathaway, President, Boston Commercial Motor Vehicle Association.

ent makes of passenger cars will be shown, including as before stated, 12 models never before displayed at any



Floor Plan, Balcony Section, Mechanics' Building, at Boston Automobile Show.

show, and 68 manufacturers of commercial vehicles will be represented, and at least 300 accessory exhibits. It will be illuminating as to the magnitude of this show, to compare these figures with the number of exhibits at New York this year, which included 83 different makes of passenger cars, 65 of trucks and 267 of accessories; while at Chicago the showing represented 85 lines of passenger cars, 57 of trucks and 201 of accessories.

Shows in the Past.

The following figures in regard to number of displays at Boston for several years past may also be found of interest for purposes of comparison:

In 1912, 107 passenger cars were shown and there were 200 accessory exhibitors.

In 1915 the number of pleasure car showings was 71, of commercial wagons, 34, and of accessories, 250.

The figures for 1916 were 76 passenger car exhibitors, including two of electric vehicles and one of steam, 33 truck makers and 175 accessory manufacturers.

In 1917, 139 different makes of automobiles were seen, divided into 89 passenger cars and 50 trucks, trailers and tractors, while the accessory exhibitors numbered 170.

The show for 1918 beat all former records, with a total of 364 exhibitors, consisting of 80 different makes of pas-

senger cars, 62 of trucks, etc., and 222 demonstrators of accessories. The total number of cars, trucks and chassis shown this year was over 460, and their combined value was estimated at \$1,500,000.

Last year, 1919, the exhibitors of passenger cars numbered 70, of commercial vehicles 56, and of accessories, 250. Exhibits This Year Valued at \$5,000,000.

The total value of the passenger cars, trucks and accessories to be gathered together for this year's showing is estimated by Manager Campbell to be nearly \$5,000,000.

It will be remembered that the various departments into which the Mechanics' building has been divided for the purposes of this show provide 105,000 square feet of floor space, so that, including the 40,000 feet afforded by the South Armory, a total area of 145,000 square feet will be given. This is the largest amount of space ever secured for this show, although in at least one previ-

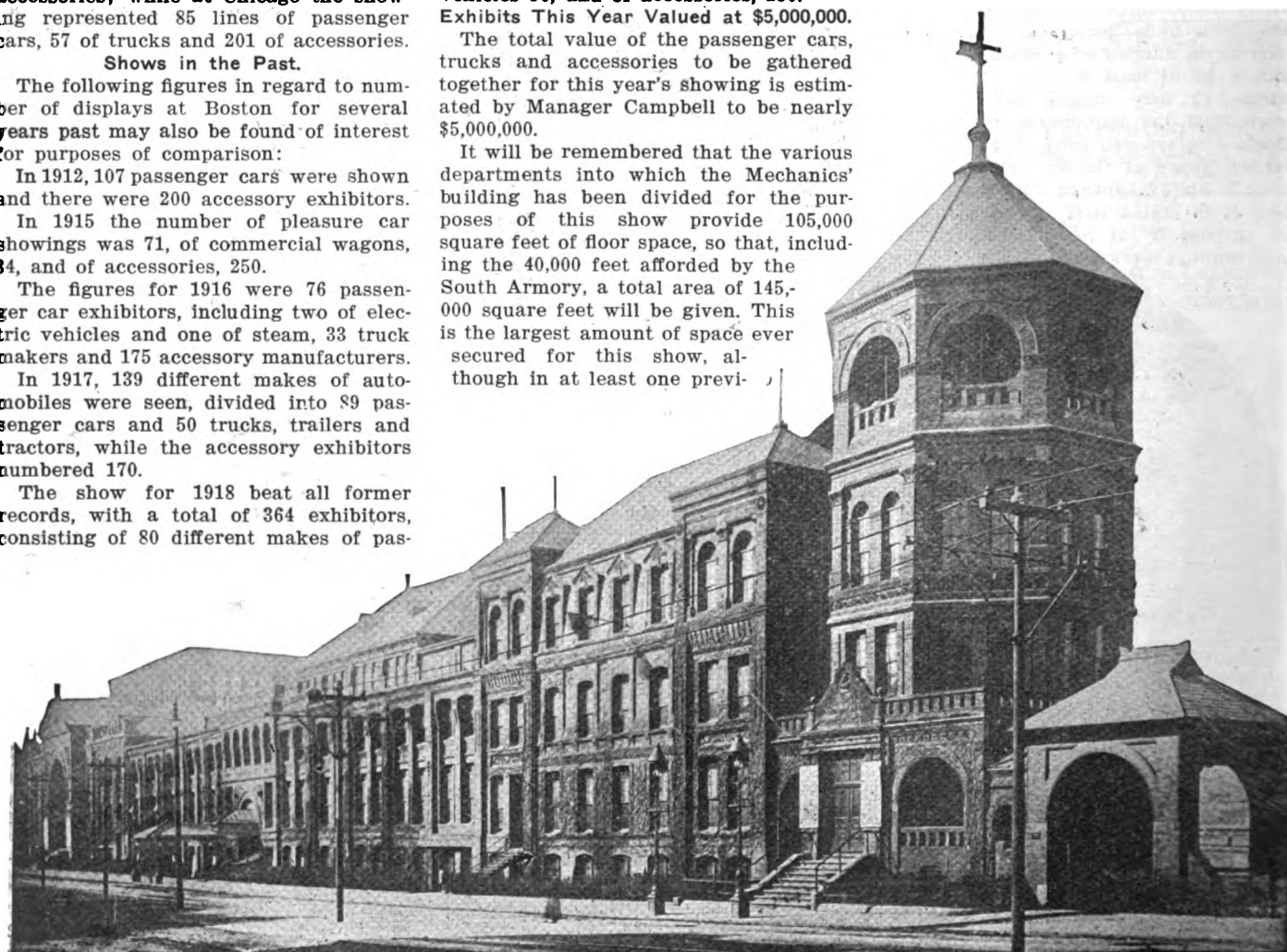
ous season there has been an overflow to Horticultural hall, which was not, however, considered a successful arrangement from all aspects on account of its comparative remoteness from the main exposition.

While the actual floor space afforded in the various buildings at the big New York and Chicago shows this year was somewhat larger than that to be utilized at Boston, the fact that some sections of these displays were separated by a distance of several miles, necessitating a trip of about an hour's duration to get from one department to another, undoubtedly cut down the attendance at the truck section, especially at New York. It may be stated, however that as the South Armory on Irvington street is only a few minutes walk and readily accessible from Mechanics' building, this show is for all practical purposes grouped at one place.

Division of Departments.

The management has allotted space as follows this year: Departments A and B, on the main floor of Mechanics' building will be occupied exclusively by passenger cars. Departments C and D in the basement will include only commercial vehicles in the former, while in the latter passenger and commercial cars, sundries and machinery will be shown.

Department E in the balcony section will house passenger cars and accesso-



Huntington Avenue Front of Mechanics' Building Looking South, Where Boston Automobile Show Is Held.

ries, and Departments F and G on this floor will be exclusively devoted to accessory exhibits.

At the South Armory will be seen both passenger cars and commercial vehicles and their respective accessories.

One Ticket for Both Shows.

One ticket will admit the visitor to both buildings, a coupon being provided which will permit admission to either place first, at the option of the holder. The general admission will be 50 cents.

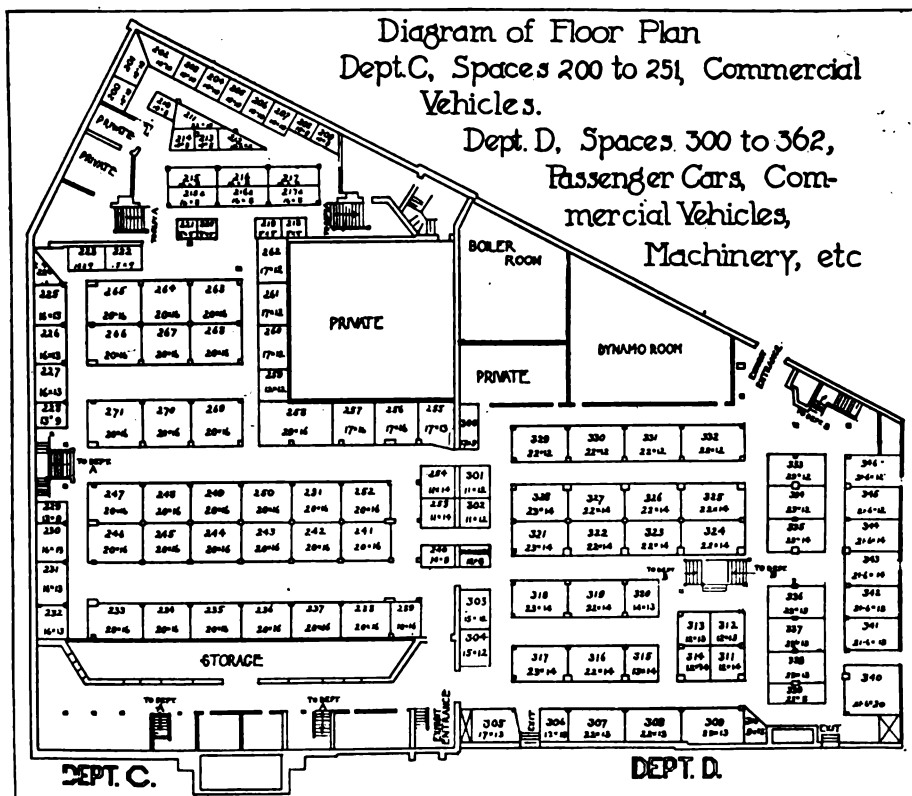
The show is again held this year under the auspices of the Boston Automobile Dealers' Association, Inc., and the Boston Commercial Motor Vehicle Association, Inc., and the general manager is Chester I. Campbell, who has directed these events from their inception, and also serves as secretary of both of the organizations sponsoring the exhibition.

The decorations will be this year again in charge of A. W. Campbell, who has presented so many strikingly appropriate settings for the event in the past. The spring-time motif this year will be presented in a setting affording delightful glimpses of Arcadia, the land of Evangeline, which will be artistically interpreted on canvas and by subsidiary decorations in harmony.

The doors will be thrown open on Saturday, March 13, at 2 p. m., and will be open every day thereafter, except Sunday, from 10 a. m. until 10:30 p. m. until and including Saturday, March 20.

Colossalness of the Show.

An idea of the colossalness of this event may be gained from the fact that over 11,000 tickets are required for the exhibitors, agents and salesmen who participate in the show during the seven days it is in progress. Even at the present high cost of living the ordinary family could live comfortably on the income afforded from the money expended in staging the exhibition.



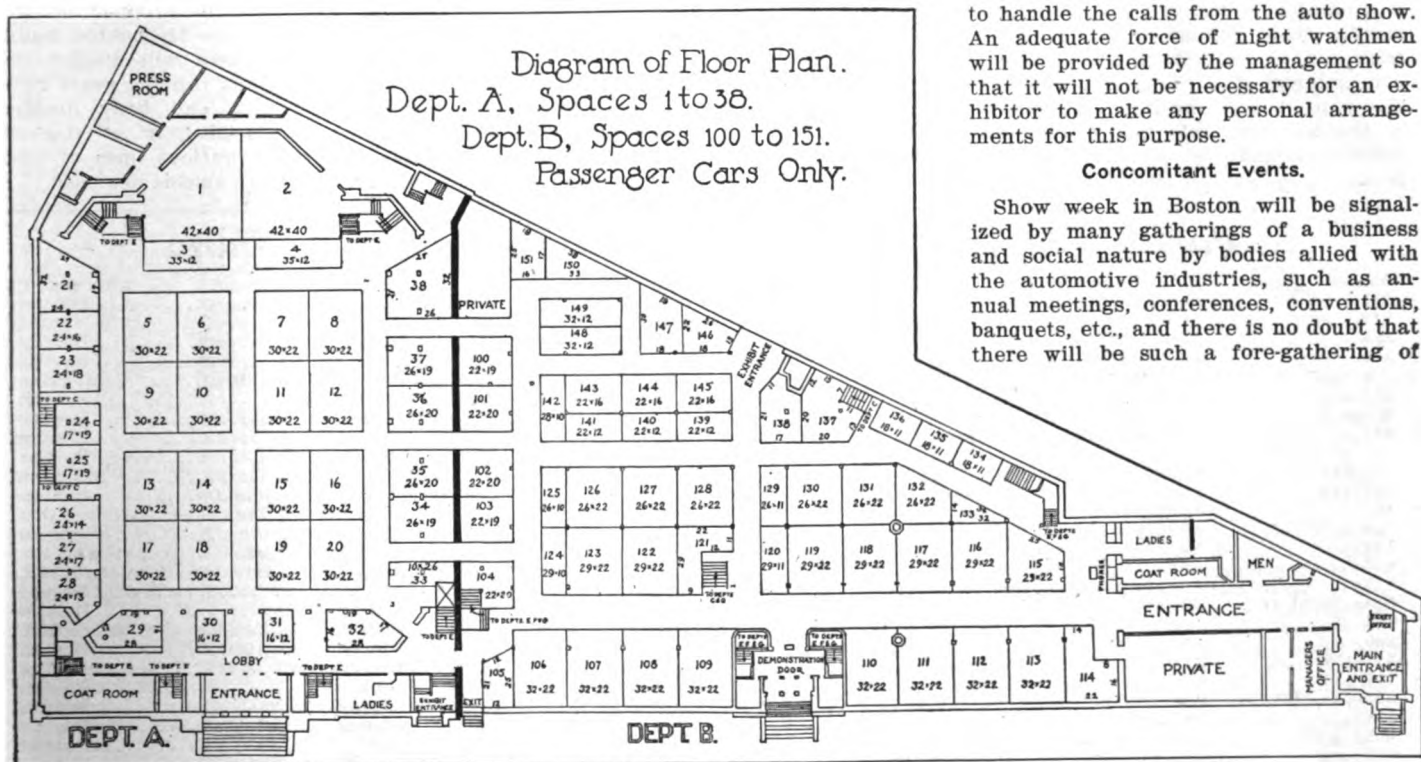
Floor Plan of Basement, Mechanics' Building, at Boston Automobile Show.

The decorations alone will cost the management close to \$50,000, while the rent of the two buildings for the time that they will be required getting in and out and the week of the show would make a big salary even in these days. Manager Campbell will have a staff of over 200 men to manipulate the machinery of the show while it is on. Add to this the advertising expenditures and other overhead and it foots up to over \$100,000.

As in the past the management will provide musical entertainment of a high order in the various departments during the show and many little touches will be noted that will add to the convenience and comfort of exhibitors and visitors, such as the Bureau of Information, located in an office near the main entrance, telephone service which includes a telephone in every exhibition space, and the Back Bay telephone exchange will have a force of 12 operatives to handle the calls from the auto show. An adequate force of night watchmen will be provided by the management so that it will not be necessary for an exhibitor to make any personal arrangements for this purpose.

Concomitant Events.

Show week in Boston will be signalized by many gatherings of a business and social nature by bodies allied with the automotive industries, such as annual meetings, conferences, conventions, banquets, etc., and there is no doubt that there will be such a fore-gathering of



Plan of Main Floor, Mechanics' Building, at Boston Automobile Show.



J. W. Maguire, Vice President, Boston Commercial Motor Vehicle Association.

representatives from the eastern section of the country as has seldom been seen at the Hub. Nor is this by any means confined to the interests directly concerned in the auto show. It has come to be recognized as Boston's greatest business week, a veritable spring time awakening to the strenuous activities of a new season. Hotels are booked to capacity far in advance, and thousands who will be in Boston that week are forced to resort to lodging houses or to rely on the hospitality of friends. Restaurants and theaters, department stores and retail merchants generally do a tremendous business. The visitors come prepared to spend liberally and millions are thus dropped into the coffers of the Boston merchant as a result of the Boston automobile show.

Many of the big selling agencies outside the automotive industry have found it profitable to make it the week to assemble their selling forces there for their annual conferences when plans are consummated for the year's campaign. The auto show is the lure. At least one of the big wholesale dry goods houses buys thousands of show tickets and sends them out to every customer in

New England. During this week it shows its new lines to customers and its entire sales force is assembled in Boston. This is so with hundreds of other concerns that cater to the New England trade.

Personnel of the Promoters.

The officials of the organizations under the auspices of which the show is held are as follows:

Boston Automobile Dealers' Association, Inc.—Directors: J. H. MacAlman, 96-100 Massachusetts avenue, president; J. S. Hathaway, vice president; F. A. Hinchcliffe, treasurer; J. W. Bowman, C. E. Fay, J. H. Johnson, J. W. Maguire, C. P. Rockwell, F. E. Wing.

Boston Commercial Motor Vehicle Association, Inc.: J. S. Hathaway, president; J. W. Maguire, vice president; E. Day Baker, treasurer; P. S. Aultman, L.



Day Baker, Treasurer, Boston Commercial Motor Vehicle Association.



J. W. Bowman, Chairman Board of Directors, Boston Automobile Dealers' Association.

B. Sanders, J. L. McKone, N. H. Halliday, J. H. MacAlman, C. P. Rockwell.

The section of the show to be housed at the South Armory on Irvington street, while given under the immediate

auspices of the Y. D. club, is at the same time under the general supervision of Manager Campbell, and is to be considered an integral part of the big show, although special features in the way of entertainment and other novelties are to be arranged by the club. The armory will also have a distinctive decorative setting, and in order to really enjoy all the attractions of the big 1920 show the visitor should take in both sections. As before stated one ticket admits to both buildings.

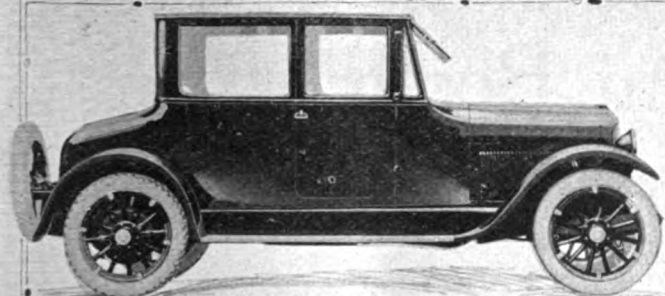
Motor trucks will have a more prominent place than ever before at this event, and the excellent showing will emphasize the great advance that has been made of late years in this utilitarian branch of the motor vehicle. These will, for the most part, be grouped on the basement floor of the Mechanics' building. The cars shown will display the fact that chassis and running gears have been strengthened, and body designs have been developed to meet the requirements of the various lines of business in which the vehicles are used.

Partial List of Exhibitors at Boston Automobile Show

Space	Name	Address	Space	Name	Address
233	Acason Motor Truck Co.	Detroit, Mich	202-203-204	Autowa Car.	Boston
710	Acme Die-Casting Corp.	Boston			
234	Acme Truck.	Cambridge	200-201	Babcock Sales Co.	Boston
839	Advance Automobile Acces. Corp.	Chicago	309-310	Baker Motor Truck Co., Day.	Boston
262	All American Truck Co.	Chicago	336-337	Baker Motor Sales Co., Inc.	Cambridge
426	Allen Car.	Boston	834	Bascom, George R.	Boston
816	American Car.	Boston	408	Bayerson Oil Works.	Boston
434	American Bosch Magneto Corp.	Springfield, Mass.	14-18	Beacon Motor Car Co.	Boston
545-546	American Chain Co.	Bridgeport, Conn.	876B	Bearings Specialty Co.	Boston
527-528	American Motor Equipment Co.	Boston	423	Becker Bros.	Chicago
801	Anderson Car.	Boston	22-23	Becker Stutz Automobile Co.	Boston
836	Anderson Electric Specialty Co.	Chicago	852	Beckley-Ralston Co., Inc., The.	New York
138	Anthony, Frank P.	Boston	236	Beeman Garden Tractor.	Brighton
617	Apco Manufacturing Co.	Providence, R. I.	810	Bethlehem Motors Corp.	Allentown, Pa.
115	Apperson Motor Car Co. of N. E.	Boston	400	Bethlehem Spark Pg. Corp.	S. Bethlehem, Pa.
Spec. Dept. G	Argonne Car.	Boston	31	Biddle Car.	Boston
605	Arrow Grip Mfg. Co., Inc.	Glens Falls, N. Y.	619	Bigelow & Dowse Co.	Boston
800AA	Atlas Truck.	Boston	622-623	Black & Decker Mfg. Co., The.	Baltimore, Md.
558-559	Atwater Kent Mfg. Works.	Philadelphia	525-526	Boice Motor Equipment Co.	Boston
134-135	Auburn Car.	W. Somerville	414	Boston Blacking Co.	E. Cambridge
323-324-325-326	Autocar Sales & Service Co.	Boston	140-144 Inc.	Boston Bulck Co.	Boston
338	Auto Gear Co. of Boston.	Boston	216-216a-217-217a	Boston Federal Truck Co.	Boston
605AA	Automatic Air Cushion Co.	Boston	146, 333	Boston Oldsmobile Co.	Boston
602	Automobile Legal Association.	Boston	849	Boston Morris Plan Co., The.	Boston
604	Automobile Mutual Fire Ins. Co.	Boston	5-9	Bowman Co., The J. W.	Boston
603	Automobile Mutual Liability Ins. Co.	Boston	24-25	Brewster Car.	Boston
			137	Briscoe	Boston

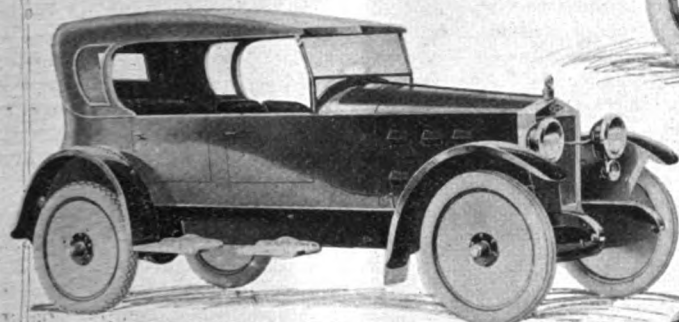
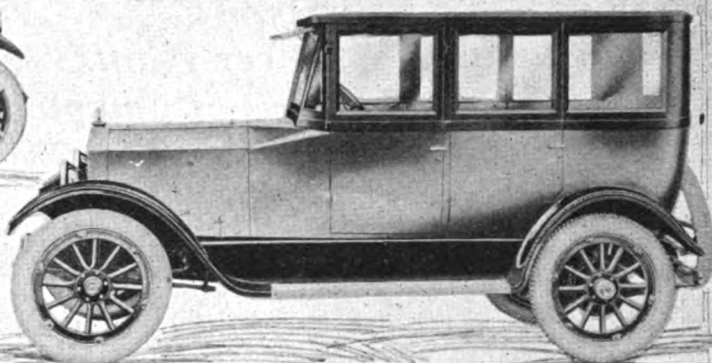
Space	Name	Address	Space	Name	Address
413	Bristol Mfg. Co.	Boston	881A	Ford Mica Co., Inc.	New York
308	Britton-Stevens Motor Co.	E. Cambridge	100-101-218-219	Ford Motor Co.	Cambridge, Mass.
338-339	Brockway Motor Truck Co.	Cortland, N. Y.	218-219	Fordson Tractor.	Cambridge, Mass.
531-532	Brooks-Skinner Co., Inc.	Quincy Point, Mass.	701	Fracto Specialty Co., Inc.	Boston
503-504	Brunner Mfg. Co.	Utica, N. Y.	406	Franklin, M.	Boston
420	Buda Co., The.	Harvey, Ill.	7-11	Franklin Motor Car Co.	Boston
140-144 Inc.	Buick Car.	Boston			
841	Burditt & Williams Co.	Boston			
600	Burton-Rogers Co.	Boston			
2	Cadillac Automobile Co. of Boston	Boston	243-250	Garford Motor Truck Co., Inc.	Boston
3	Caldwell, Inc., Frederick J.	Boston	624	Gill Piston Ring Co.	Boston
606	Campbell Co., A. S.	Boston	17B	Gilmore Motors, Inc.	Boston
301, 302, 522	Campbell Motors Corp.	Boston	319-320	G. M. S. Truck.	Boston
24-25	Canterbury, Inc., George W.	Boston	151	Grant Motor Sales Co.	Boston
803	Capitol Motors Corp.	Fall River, Mass.	611	Greb Co., The.	Boston
411	Carroll Mfg. Co.	Arlington, Mass.	540	Green & Swett Co.	Boston
435	Case Car.	Boston	621	Greene Co., Joseph E.	Boston
437AA	Cee & Vee Products Co.	New York	610	Grow Tire Co.	Boston
702	Central Automobile Tire Co.	Boston	300	Guaranty Motors Co.	Cambridge, Mass.
512	Challoner Co.	Oshkosh, Wis.	31	Guertin-De Rochemont Co.	Boston
117-118-132	Chalmers Car.	Boston			
518-519	Champion Ignition Co.	Flint, Mich.	Special Dept. G.	Hall Motor Co.	Boston
537	Champion Spark Plug Co.	Toledo, O.	502	Halliday Co., L. P.	Streator, Ill.
132A-123-124	Chandler Motors of N. E.	Boston	401	Harnett Lubricating Co.	Boston
435	Chase & Co., L. C.	Boston	719-720-822-829	Harris Motors Co., Inc.	Boston
843	Cherry, Inc., A. L.	Boston	26-27-28	Hart Co., A. T.	Boston
116-133-344	Chevrolet Motor Co. of N. E.	Boston	607-508	Hartford, Inc., Edward V.	New York
837	Clamert Mfg. Co.	Pittsburgh, Pa.	405	Hart & Hutchinson Co., The.	Boston
260-261	Clark Equipment Co.	Buchanan, Mich.	418	Hassler, Inc., Robert H.	Indianapolis, Ind.
134AA	Class Journal Co.	New York	38	Haynes Car.	Boston
236	Cletrac Tractor.	Somerville	26-27-28	H. C. S. Car.	Boston
122A-123-124	Cleveland Car.	Boston	125-126-127B	Henley-Kimball Co.	Boston
800AA	Clydesdale Truck.	Boston	804	Hennigan, Inc., Walter B.	Boston
859	Cobb Electrical Appliance Co.	Forest Hills	108-109-313-314	Henshaw Motor Co.	Boston
439	Cochran Mfg. & Forging Co.	Chicago	442-443	Hillman Auto Supply Co.	Boston
36-37	Cole Car.	Boston	121-122B	Hinchcliffe Motor Co., The.	Boston
726-727	Columbia Tire & Top Co.	Boston	856	High-Volt Transformer Mfg. Co.	Milwaukee
113-114	Columbia Car.	Boston	800AA	Holland System Inc., Trading Corp.	Boston
253-254	Commerce Truck.	Boston	732	Holmes Motors, Inc.	Boston
425	Commonwealth Car.	Boston	232-807	Hosmer-Hald Co., Inc.	Boston
542-543	Connell Co., W. J.	Boston	409	Houde Co., The.	Cambridge, Mass.
129-130-131	Connell & McKone Co.	Boston	125-126-127B	Hudson Car.	Boston
842	Copithorn Mfg. Co.	Boston	517	Hudson Motor Specialties Co.	Philadelphia
704	Corlew & Co., Frank S.	Boston	232-807	Huffman Truck and Car	Boston
510	Cotta Transmission Co.	Rockford, Ill.	Special Dept. G	Hupmobile Car.	Boston
815	Cotton Motor Co.	Boston	818-833		
500-501	Coward Auto Supply Co.	Boston	851	Indiana Boston Truck Corp.	Cambridge
415	Crew Levick Co.	Cambridge, Mass.	237-238.	Inside Spot-Light Control Co.	Toledo, O.
814	Crow-Elkhart Car.	Boston		International Harvester Co. of America	Somerville
813	C-T Truck.	Boston			
4-329	Cunningham Son & Co., James.	Boston	427	Jackman-Jameson Motor Co.	Boston
844	Curtis Pneumatic Mch. Co.	St. Louis, Mo.	719-720	Jackson Car.	Boston
			822-829	Jackson Four Wheel Drive Truck.	Boston
			554-555	Jackson, Inc., Charles A.	Boston
			236	Jackson Motor Service Co.	Brighton
			819	Johnson, Arthur G.	Cambridge, Mass.
5-9	Daniels Car.	Boston	121-122B	Jordan Car.	Boston
444	Davis & Co., W. E.	Providence, R. I.	253-254-426	Judd, John L.	Boston
425	Davis Car.	Boston	806	Jumbo Truck.	New York
410	Davis Chemical Mfg. Co.	Brockton, Mass.			
616	Davis-Lynn Storage Battery Co.	Lynn, Mass.	711	K-P Products Co., Inc.	New York
627	Davis-Watson Mfg. Co.	Nashua, N. H.	844-885	Keith Trailer Co., Sylvester H.	Middleboro
340	Day-Elder Truck.	Boston	330-331-332	Kelly Springfield Motor Truck Co.	Boston
707-708	Dayton Steel Foundry Co., The.	Dayton, O.	139-145	King Motors, Inc.	Boston
805-812	Denby Truck.	Boston	330	Kinney Mfg. Co., The.	Jamaica Plain
709	Derf Mfg. Co., The.	New York	428	Kissel Car.	Boston
417	Detroit Pressed Steel Co.	Detroit, Mich.	229-230	Kissel Truck.	Boston
104	Detroit Electric Car.	Boston	269-271 Inc.	Kress & Co., O. F.	Lawrence, Mass.
850	Dickerson, C. A.	Chicago, Ill.			
547-548	Dixon Crucible Co., Joseph.	Jersey City, N. J.	234	Lally Sons Co., Eugene F.	Cambridge, Mass.
108-109	Dodge Bros. Car.	Boston	835B	Lambert Trublrput Tire Co.	Waverley, Mass.
313-314	Dodge Bros. Truck.	Boston	255-256	Lampee & Hitchcock, Inc.	Boston
111-112	Donovan Motor Car Co.	Boston	563	Lane Bros Co.	Poughkeepsie, N. Y.
32	Dort Car.	Boston	215-215A	Lebon-Kidd Co., The.	Boston
845	Double Seal Ring Co.	Boston	147	Leghorn, G. M. Co.	Boston
875	Duby, John F.	Mattapan, Mass.	34-35	Lexington Automobile Co.	Boston
148, 149, 447	Dunbar, Sanders, Inc.	Boston	147	Liberty Car.	Boston
255-256	Duplex Truck.	Boston	833	Lincoln Products Co.	Boston
715	Duplex Rim Device Co.	Chicago			
134-135	Dutton Motor Co., F. A. W.	Somerville, Mass.	119-120-321-322-	Linscott Motor Co.	Boston.
445-446	Dyer Co., The G. H.	Cambridge, Mass.	327-328	Linscott Supply Co.	Boston
			521	Locomobile Co. of America, The.	Boston
813	Eastern Electric Vehicle Co.	South Boston	13-17A-235	Lucia Mfg. Co., Inc.	New York
846	Eastern Rubber Co.	Philadelphia, Pa.	887	Luthy Storage Battery Co.	New York
713	Easton Machine Co.	South Easton, Mass.	714	Lyons Ignition Co.	New York
855	Eastern Motor Sales Co.	Boston	861	Lyknu Polish Mfg. Co.	Boston
847	Economy Timer Co.	Norwalk, Conn.	881B		
708	Eisner Lenk Co.	Boston			
139-145	Elcar Car.	Boston	15-19	MacAlman, J. H.	Boston
549-550	Electric Storage Battery Co., The.	Boston	303	MacBride Co., Inc., George W.	Boston
825-826	Emery Co., J. W.	Boston	308	Maccar Truck.	E. Cambridge, Mass.
125-126-127b	Essex Car.	Boston	257-258-259	Mack Motor Truck Co.	Cambridge, Mass.
			16-20-263-268 Inc.	Maguire Co., J. W.	Boston
210-214 Inc.	Fairbanks Co., The.	Boston	717-718	Malbohm Car.	Boston
29	Falk-Baker Co.	Boston	717-718	Mann Motor Car Co.	Boston
882	Farm Tractor & Supply Co.	Boston	8-12	Marmon Car.	Boston
117-118-132-334			311-312	Martin-Parry Corp.	Boston
335	Fay-Allen Co., C. E.	Boston	888	Marvel Machinery Co.	Minneapolis, Minn.
216-216A-217-217A	Federal Truck.	Cambridge, Mass.	425	Massachusetts Motors, Inc.	Boston
815	Ferris Car.	Boston	882	Master Trucks, Inc.	Chicago
608	Flentje, Ernst.	Cambridge, Mass.	117-118-132	Maxwell Car.	Boston
864-865	Flexume Sign. Co., Inc.	Boston	334-335	Maxwell Truck.	Boston

Space	Name	Address	Space	Name	Address
138	McFarlan Car.....	Boston	432	Schraeder's Son, Inc., A.....	Brooklyn, N. Y.
523	McQuay-Norris Mfg. Co.....	St. Louis, Mo.	340-314	Schuh Motors Co.....	Boston
205-206	Mead Morrison Mfg. Co.....	E. Boston	723-724-725-800	Scripps Booth Motor Car Co.....	Boston
17B	Mercer Car.....	Boston	336-337	Selden Truck.....	Cambridge, Mass.
233	Merchants Motors, Inc.....	Boston	231	Service Truck.....	Boston
728-731 Inc.	Metz Sales Corp.....	Boston	240	Sewell Cushion Wheel Co.....	Boston
30	Middlesex Motor Car Co.....	Boston	880	Shotwell Pump & Tank Co.....	Brighton
104	Milburn Electric Car.....	Boston	806	Simmons Co., John.....	New York
853-854	Millor Distributing Co. of N. E.....	Boston	524	Simms Magneto Co., The.....	E. Orange, N. J.
Paul Revere Hall	Mitchell Car.....	Boston	869	Simplicity Mfg. Co.....	Grand Rapids, Mich.
402-403	Minard Co.....	Framingham, Mass.	871	Sinclair Refining Co.....	Chicago
Paul Revere Hall			36-37	Smith & Sons Co., Bryant G.....	Boston
811	Mitchell-Lucas Motor Co.....	Boston	222-223	Smith Wheel, Inc.....	Syracuse, N. Y.
538-539	Mitchell & Smith, Inc.....	Boston	407	Specialty Mfg. Co.....	Arlington, Mass.
30	Monroe Car.....	Boston	419	Splitdorf Electrical Co.....	Newark, N. J.
448-449-450	Moon Car.....	Boston	207-208-209-800A	Springfield Commercial Body Co.....	Cambridge
416	Moreton Corp., Walter H.....	Boston	431	Standard Oil Co. of N. Y. (N. E. Dept.)	Boston
618	Morgan Mfg. Co., Inc., The.....	Keene, N. H.	520	Standard Parts Co. of Del., The.....	Boston
102-103	Morse, Alfred Cutler.....	Boston	110	Standard Steel Motor Car Co.....	Boston
557	Mosler & Co., A. R.....	Mt. Vernon, N. Y.	560	Standard Thermometer Co.....	Boston
505-506	Moto-Meter Co., Inc., The.....	L. I. City, N. Y.	21	Stanley Motor Carriage Co.....	Newton, Mass.
705	Motor Accessories, Inc.....	Boston	700	Stanley Co., Inc., John T.....	New York
609	Motor Parts Co.....	Boston	15-19	Stearns-Knight Car.....	Boston
516	Motor Vehicle Publishing Co.....	New York	870	Steel Products Equipment Co., The.....	Boston
	Motor & Accessory Mfrs. Ass'n.....	New York	612	Stenman Elec. Valve Grinder Co.....	Worcester
239	Mutual Motor Sales Co.....	Boston	804	Stephens Car.....	Boston
			226-227-228	Sterling Motor Truck Co. of N. E.....	Boston
105-106-107	Nash Car.....	Boston	24-25	Stevens-Duryea Car.....	Boston
315-316-317	Nash Truck.....	Boston	304-305-306	Stewart Automobile Corp.....	Boston
26-27-28	National Car.....	Boston	104-345	Stimpson, E. Y.....	Boston
224-225	Netco Truck.....	Fitchburg, Mass.	562	Story Rubber Corp.....	New York
886	New Britain Machine Co.....	New Britain, Conn.	835A	Storti, Angelo B.....	Providence, R. I.
886	New Britain Tractor.....	New Britain, Conn.	111-112	Studebaker Car.....	Boston
816	N. E. American Motor Car Corp.....	Boston	22-23	Stutz Car.....	Boston
866	New England Auto Parts Co.....	Boston	811	Sullivan Truck.....	Boston
424	New England Motors, Inc.....	Boston			
224-225	N. E. Motor Truck Co.....	Fitchburg, Mass.	3	Templar Car.....	Boston
857	New England Savold Tire Co.....	Boston	422	Texas Co., The.....	Boston
137-342-343	New England Velie Co.....	Boston	566	Tidewater Oil Sales Corp.....	Boston
511	New Era Spring & Specialty Co.....	Boston	877	Tigar Bearings Co., Inc., M. George.....	Boston
37	New York Lubricating Oil Co.....	Boston	235	Traffic Truck.....	Boston
613	Nielsen Co., V. A.....	Boston	830	Traylor Engineering Mfg. Co.....	Conwells, Pa.
412	No-Leak-O Piston Ring Co.....	Baltimore, Md.	564	Trexler Co., The.....	Philadelphia, Pa.
424	Noma Car.....	Boston	234	Triangle Truck.....	Cambridge, Mass.
318	Northway Motors Corp.....	Boston	448-449-450	Triangle Motors Co.....	Boston
716	Northwestern Chemical Co., The.....	Marietta, G.	706	Triplex Safety Glass Corp. of America, Inc.	New York
319-320	Noyes-Bulck Co., The.....	Boston			
863	Nu Back Manufacturing Co.....	St. Louis, Mo.	315-316-317	Troy Trailer, Inc.....	Boston
625	Nutter Electric Equipment Co.....	Boston			
			819	Ultimate Truck.....	Cambridge, Mass.
148-149	Oakland Car.....	Boston	536	Underhay Oil Co.....	Boston
146	Oldsmobile Car.....	Boston	712	U. S. Air Compressor Co.....	Cleveland, O.
333	Oldsmobile Truck.....	Boston	436	U. S. Light & Heat Corp.....	Niagara Falls, N. Y.
309-310-331	Oneida Motor Truck Co.....	Boston	823-828	U. S. Motor Truck Co. of N. E.....	Boston
136	Osborn-MacMillan, Inc.....	Boston	874	U. S. Specialty Co.....	Boston
129-130-131	Overland Car.....	Boston	858	Universal Top & Body Co.....	Boston
			620	U-Sav-Your Mfg. Co.....	Warren, Mass.
			522	Utilitor Tractor.....	Boston
			32	Utterback-Gleason Co.....	Boston
1-241-242-251-252	Packard Motor Car Co. of Boston.....	Boston			
127A-128-307	Paige-Detroit Co. of N. E.....	Boston	862	Vacuumeter Selling Co.....	Boston
802	Paterson Car.....	Cambridge, Mass.	433	Vacuum Oil Co.....	New York
14-18	Peerless Car.....	Boston	137	Velie Car.....	Boston
541	Perrine Co.....	Boston	525-526	Vesta Accumulator Co.....	Chicago
438	Pettingell-Andrews Co.....	Boston	220-221	Victory Motor Co.....	Boston
303	Phenix Truck.....	Boston	824-827	Vim Motor Truck Co. of N. E.....	Boston
16-20	Pierce Arrow Car.....	Boston	873	Vim Unit Remagnetizer, The.....	Paterson, N. J.
263-268 Inc.	Pierce Arrow Truck.....	Boston			
150	Premier Car.....	Boston	561	Walden-Worcester, Inc.....	Worcester, Mass.
802	Porter Square Motor Co.....	Cambridge, Mass.	820	Walker-Johnson Sales Co.....	Boston
868	Postal & Miller.....	Boston	346	Walker Vehicle Co.....	Boston
607	Pressure Proof Piston Ring Co.....	Boston	346	Walker Electric Truck.....	Boston
601	Presto-Felt Mfg. Co., The.....	Boston	820	Walker-Johnson Truck.....	Boston
239-230-428	Proctor Fisher, Inc.....	Boston	808	Walter Transport Sales Co.....	Boston
626	Pruyn Bearing Co.....	Boston	551-552	Waltham Watch Co.....	Waltham, Mass.
			345	Ward Electric Truck.....	Boston
817	Rauch Lang Electric Car.....	Boston	529-530	Weaver Mfg. Co.....	Springfield, Ill.
867	Record Tire Sales Co.....	Boston	150	Wells Motor Co.....	Boston
102-103	Renault Car.....	Boston	427	Westcott Car.....	Boston
119-120	Reo Car.....	Boston	544	Westinghouse Air Spring Co.....	Boston
321-322-327-328	Reo Truck.....	Boston	430	Wetmore-Savage Co.....	Boston
215-215A	Republic Truck.....	Boston	244-249 Inc., 269-270-271	White Co., The.....	Boston
136	Revere Car.....	Boston	429	White & Bagley Co., The.....	Worcester, Mass.
809	Reynolds Motor Truck Co.....	Mt. Clemens, Mich.	887	Whiting & Comstock.....	Hartford, Conn.
285	Riker Truck.....	Boston	879	Whittredge Portable Steel Bldg. Co.....	Lynn
33	R. & V. Motors of New England.....	Boston	876A	Wight, Austin J.....	Boston
102-103	Roamer Car.....	Boston	509	Willard Storage Battery Co.....	Boston
105-106-107-315-316-317	Rockwell, Inc., C. P.....	Boston	202-203-204	Will-Hall-Sutherland Motors, Inc.....	Boston
817	Rommelfanger, N.....	Boston	129-130-131	Willys Knight Car.....	Boston
113-114	Ross, Inc., R. R.....	Boston	534-535	Wilson Co., John V.....	Boston
440	Ross Gloss Co.....	Auburndale, Mass.	553	Wilson, K. R.....	Buffalo, N. Y.
513-514-515	Rowe Calk & Chain Co., The.....	Plantville, Conn.	821	Wilson Motor Truck Sales Co. of N. E.,	Boston
38-231-301	Russell Co., The, W. L.....	Boston	8-12	Wing, Frank E.....	Boston
			878	Winsor & Son, Alfred.....	Boston
611	Salman, John A.....	Boston	825-826	Winther Truck.....	Boston
872	Sanderson Co., E. P.....	Cambridge, Mass.	6-10	Winton Co., The.....	Boston
341	Sandow Motor Truck Co. of N. E.....	Boston	421	Wire Wheel Corp. of America.....	Buffalo, N. Y.
255-256	Sanford Truck.....	Boston	805-812	Woodbridge Co., Inc.....	Boston
721-722	Sargent & Ham Co.....	Boston	404	Wright "Name On" Robe Co.....	Waterville, Me.
29	Saxon Car.....	Boston			

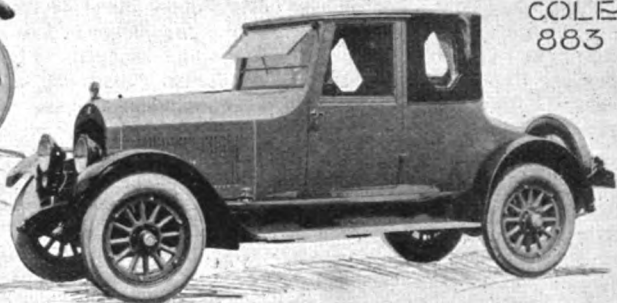


PAIGE-DETROIT
6-55

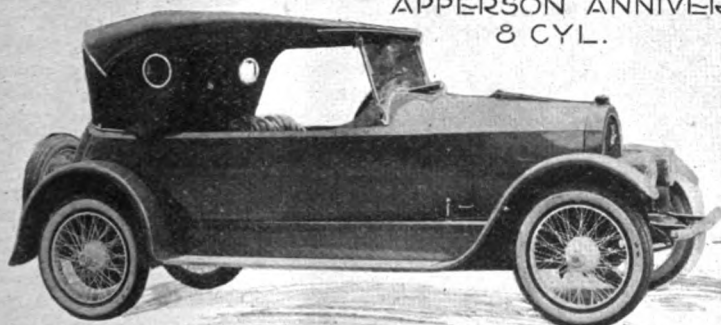
DIXIE FLYER HS
4 CYL.



JACKSON 38
6 CYL.



COLE
883



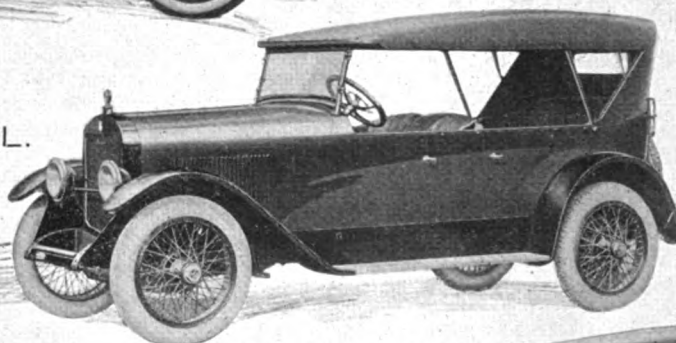
APPERSON ANNIVERSARY
8 CYL.



CHANDLER
6 CYL.



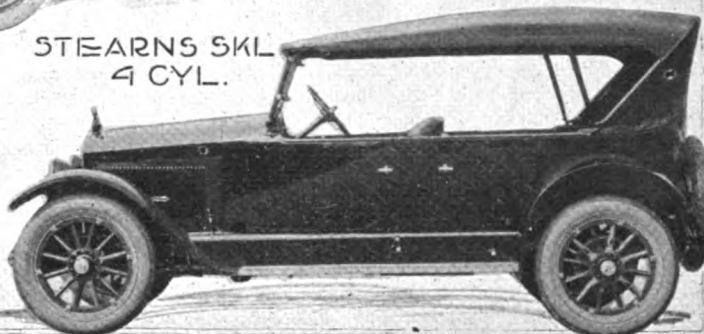
KING
8 CYL.



STEARNS SKL
4 CYL.



HUDSON
6 CYL.



Distinctive Features of New Cars to Be Seen at Boston

Standardization of Power Plants, Refinement in Body Design and Completeness of Equipment Signalize Advent of Almost Ideal Motor Vehicle.

ALTHOUGH, as is to be expected, the Boston automobile show, inasmuch as it is the last of the three big metropolitan events to be staged, and coming, as it does, so near the actual opening of the touring season, is in a measure a replica of the offerings in new cars featured at the New York and Chicago displays, it is invariably signalized by the showing of a number of new lines and models not before seen. For instance, this year, at latest accounts, the passenger car list at Boston will include at least 12 new makes of cars never before exhibited at any show.

As was the case at the earlier events, it is indicated that the passenger cars to be shown at Mechanics' building and South Armory the week of March 13-20 will present no striking changes in appearance, mechanical make-up or equipment. The trend is towards the retention and further standardization of whatever has been proved by experience to make for utility, convenience and comfort rather than for mere luxuriousness and strikingly showy effects in finish and design. At the same time the manufacturers have not stinted their efforts to add anything that might appeal to the season's demand for a car that combines economy and ease of operation and guaranteed service with substantiality and elegance of appearance.

Popularity of Enclosed Cars.

The increasing popularity of the enclosed car will be even more marked at Boston than at the previous big shows. There is hardly a manufacturer this year who has not included in his offerings at least one closed model, and some makers have added a number, rendering their lines sufficiently comprehensive and varied to suit any taste in an all-season car, no matter how exacting it may be in the matter of refinement of design, completeness of equipment and elegance of furnishings.

One feature of the design of the 1920 enclosed cars is the presentation in a number of instances of sedan models, which are readily convertible into limousines by simply raising a glass partition at the back of the front seat. There is also a noticeable tendency in the design of closed cars to put as much space as possible into glass in windows and doors, which adds to the enjoyment of the occupants when touring amid scenic beauties. In warm weather these windows may be readily dropped out of sight. The trend seems to be toward

the four-door type, and the doors are made amply wide so as to add to the ease of entrance and egress. Some models are also designed to meet the demand for increased head room without, however, giving any noticeable appearance of unproportionate height.

In body finish, dark colors—black in a considerable number of cases—predominate, unrelieved by the touches of color which were noticeable a few seasons ago, sometimes being even startling in their contrasts. A simple but elegant ensemble seems to be the aim of designers this season, and interior furnishings are, as a general rule, strictly in harmony with this idea. It must be admitted, however, that at some of the later western shows, notably Kansas City, there has been reported some tendency towards a revival of a more lively color scheme in body finish, and this may be the beginning of a breaking away from the dull colors and simple lines dictated by the war policies of car builders.

Features in Open Models.

Open cars show a blending and harmonizing of the lines of radiator, bonnet, cowl and body so as to give an appearance of speed capability, strength and staunchness. The general effect of raciness is accentuated in many instances by an increase of several inches in wheelbase and a lowering and straightening of top body lines, while tops are so designed and fitted to the body as to enhance this idea. Such little refinements as the conformity in angle of slant of instrument board, windshield, louvres of the bonnet, etc., are noticeable.

In a few new cars, such for example as the DuPont, something of a foreign mode is given by the distinctive shape of radiator and hood, while in other models the French influence is manifested in plaited upholstery, the design of the louvres and other little touches.

Liberality of Equipment.

While prices of nearly all lines and models have been sharply increased this season, this is partially at least compensated in the increasing spirit of liberality on the part of manufacturers in the way of refinements in equipment and furnishings. In some of the more expensive enclosed cars this almost approaches prodigality, but even the low and medium priced cars are now equipped with every necessity and many conveniences that add to the comfort

and pleasure of driver and passengers. Where a few years ago it was necessary to add a substantial sum to the initial cost of the car to bring its equipment up to the point of convenience, to say nothing of comfort, with hardly an exception today when the automobile reaches its purchaser there is assurance of being able to commence its use without the expense and delay formerly incidental in the way of equipment.

For instance, one of the medium priced touring car models includes as regular equipment at the listed price in addition to routine specifications, which comprehend such standardized components as force feed lubrication, water pump cooling system, battery ignition, two-unit starting system, electric lights and vacuum fuel system, the following: Top, top hood, windshield, speedometer, ammeter, oil gauge, locked electric switch, tire pump, electric horn, motor light, shock absorbers all around, tonneau light, emergency gasoline valve, muffler cut out, foot pedal pads, motometer, transmission theft lock, demountable rims and complete tool equipment. The sedan model of the same car is equipped without extra cost, in addition to that mentioned, with clock, smoking and vanity sets, and dome, corner and step lights.

The same make of car seven years ago specified as extra equipment: Top, top hood, electric lighting, electric self-starter, windshield, speedometer and demountable rims. The list price for the touring car model this year is only \$100 more than in 1913, despite all the additional equipment.

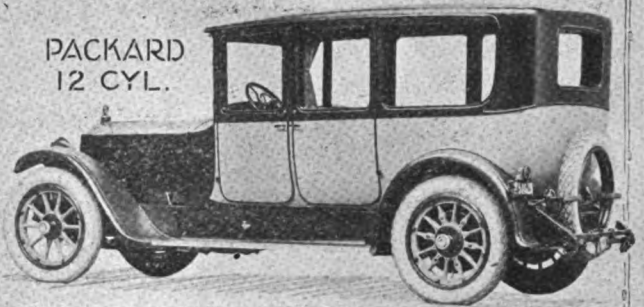
Increase in Wire and Solid Wheels.

More cars than heretofore are offered with wire wheels in place of the artillery type, while solid wheels are seen on an increasing number of models this year, among them being noted Apperson Eight, Westcott C-48 touring, Cole Aero Eight Sportsedan and Touroline, Elgin Six, McFarlan Six touring type 125, Paige Larchmont Sport, Jackson Six, Jordan F, Ferris Six, Rock Falls and Elcar D touring.

The solid wheel lends itself well to effective variations of design in mold and color, and the touch of class and distinctiveness imparted to the smart cars thus equipped is sure to attract attention wherever seen, as wire and wood spoke wheels are still so much in preponderance that the disc wheels are ren-



GRANT
6 CYL.



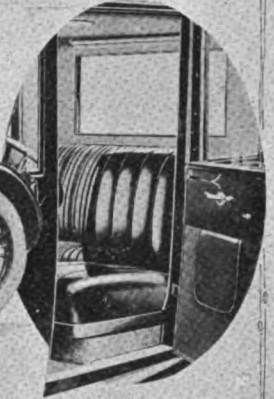
PACKARD
12 CYL.



INTERIOR
OF CHANDLER 6



FRANKLIN
6 CYL.



DRIVER'S SEAT - LIBERTY 6



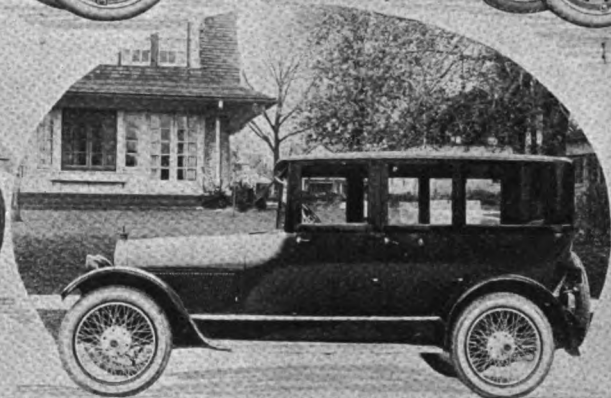
CHALMERS
6 CYL.



BUICK
6 CYL.



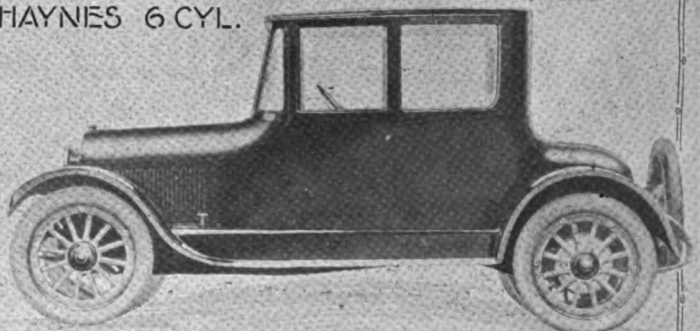
STEPHENS
SALIENT SIX



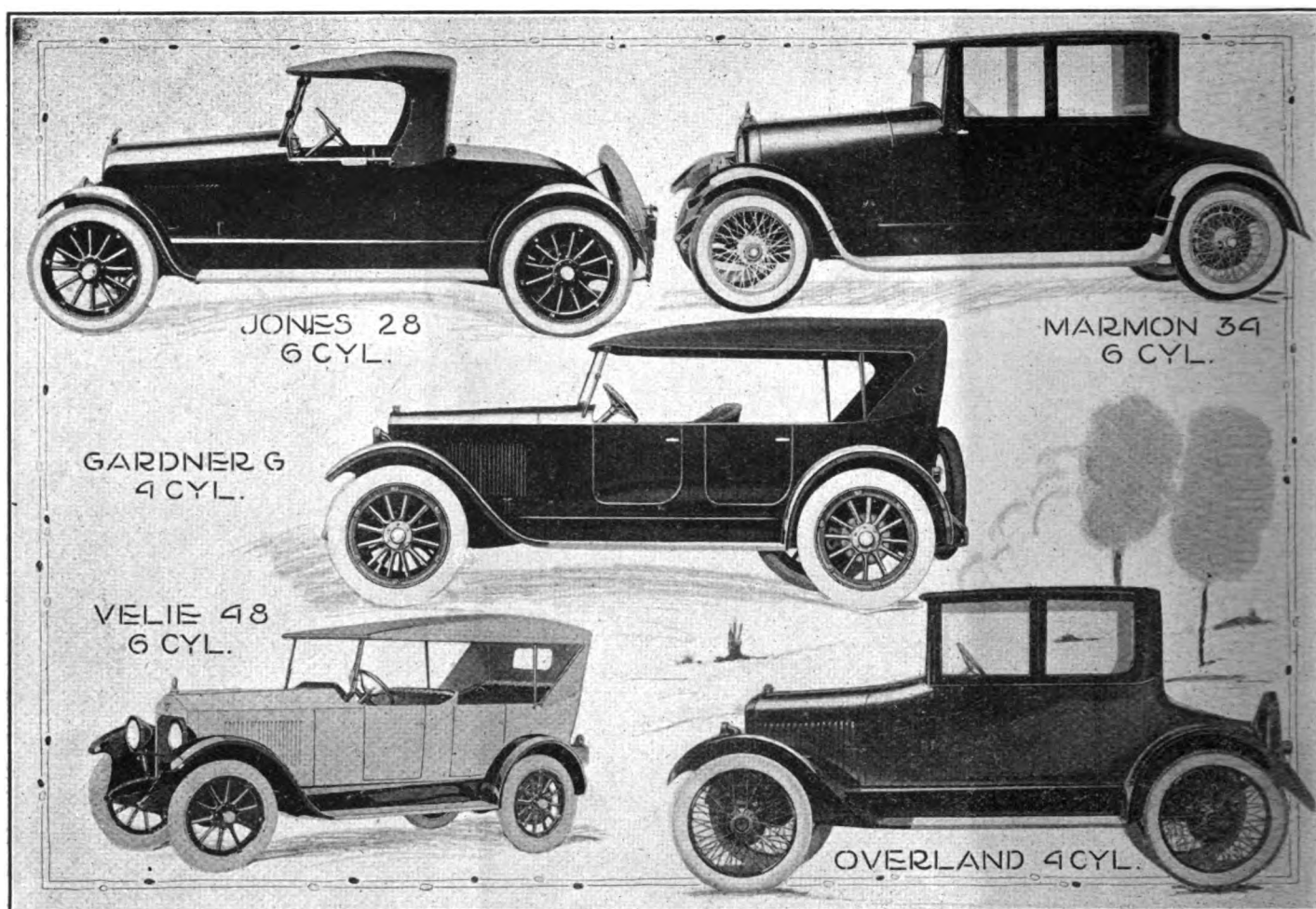
HAYNES 6 CYL.



OKLAND
6 CYL.



REC 6 CYL.



dered all the more conspicuous by contrast.

With the perfection of an adequate and reliable electric lighting system on all cars the trend is to increase the number of lights so as to afford the greatest utility. Some present as many as three sets in addition to regulation members for instrument board, tail light, etc., mounted at various positions in front, on the cowl, mud guards, etc. A number are equipped with double headlights, the smaller set to be used under anti-glare conditions, being suspended from the main members by brackets. Others offer a set of lights on the cowl to be turned on when the car is parked. Some of the more luxurious lines fur-

nish reading lamps for touring car models as well as on the enclosed, and a spot light equipment is becoming standard on a number of makes.

The regulation headlights are presented in an almost infinite variety of shapes and colors of lenses, shades, dimmers and other devices to comply with anti-glare regulations in various states. Refinements are also noted in the form, finish and manner of mounting of these members, which render them highly ornamental as well as utilitarian.

The driver's convenience and comfort is catered to by a tendency to still further centralize and group all components pertaining to the car's operation and control directly under his hands

either on steering wheel circle or instrument board in immediate proximity.

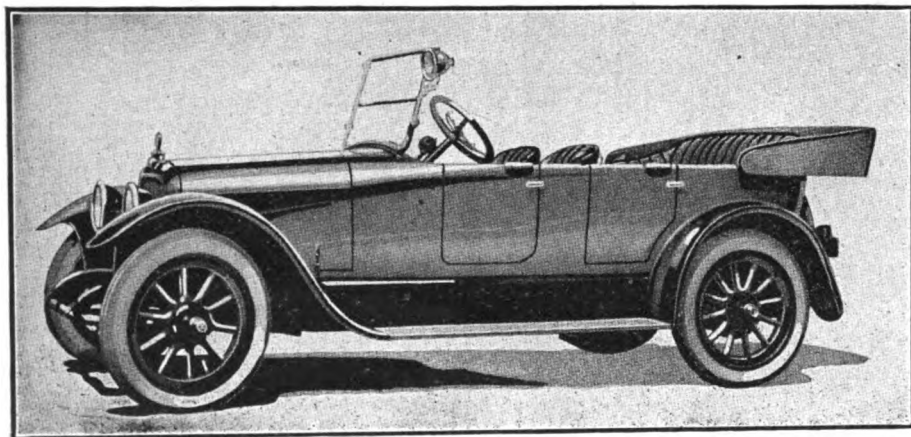
The steering wheel in a considerable number of instances is hinged so as to be tilted or turned up when the driver desires to enter or leave his seat, and the seats themselves are cushioned and in some cases made adjustable so as to afford the operator the same degree of comfort as is enjoyed by the other occupants of the car.

Mechanical Features.

In regard to mechanical changes and refinements, it may be stated that the prospective owner now, as a general rule, chooses his car first of all from the standpoint of the performance of the power plant. He wants to be assured of the engine's reliability under all ordinary conditions of service, as well as that it affords a safe margin of surplus energy to be manifested by its accelerative ability, hill climbing efficiency, etc.

In this connection it may be noted that there seems to be a determination on the part of designers to get all the power possible out of the smaller engine. It is stated that the average cylinder displacement of the engines of American cars has been gradually decreasing while the efficiency of the power plant has been increasing. This has been achieved in several different ways.

In the first place there has been a noticeable increase in the number of overhead valve engines. This type of power plant is known to be capable of an excep-

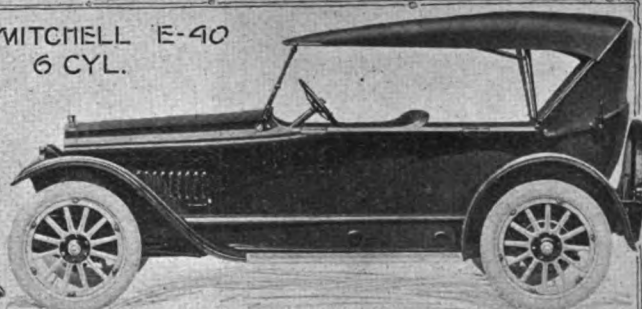


Templar Five-Passenger Touring Car, Showing Its Sturdy, Long, Low-Hung, Comfortable Lines.

ALLEN 43-P
4 CYL.



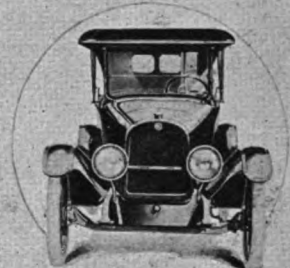
MITCHELL E-40
6 CYL.



BRISCOE
4-24



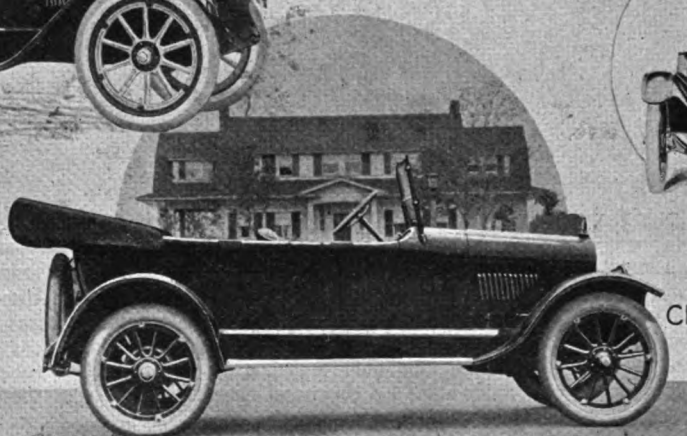
ELGIN K
6 CYL.



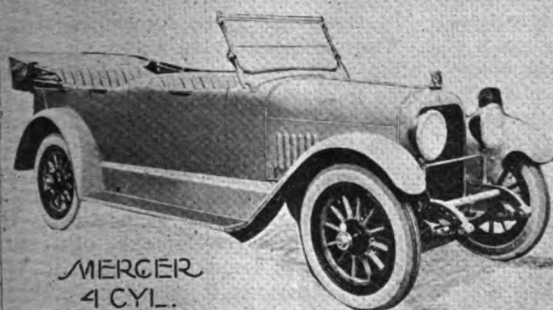
DORT 10-15
4 CYL.



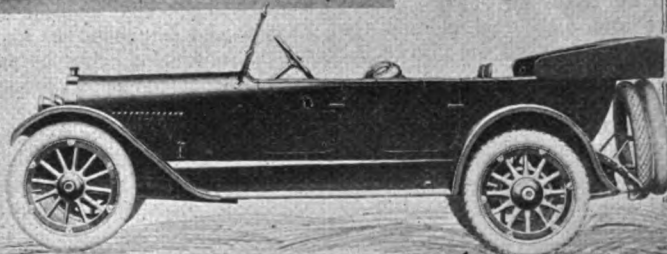
HUPMOBILE - DASH CONTROL



CROW-ELKHART H-55
6 CYL.



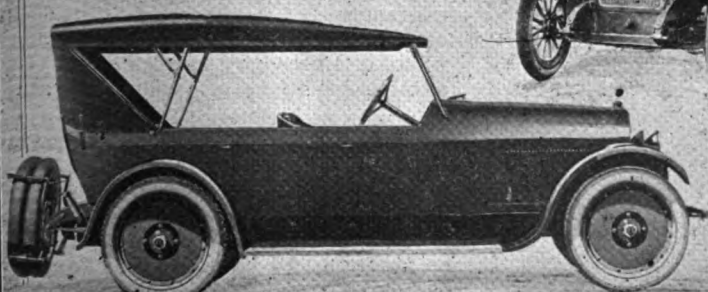
MERCER
4 CYL.



OLDSMOBILE 45B 8 CYL.



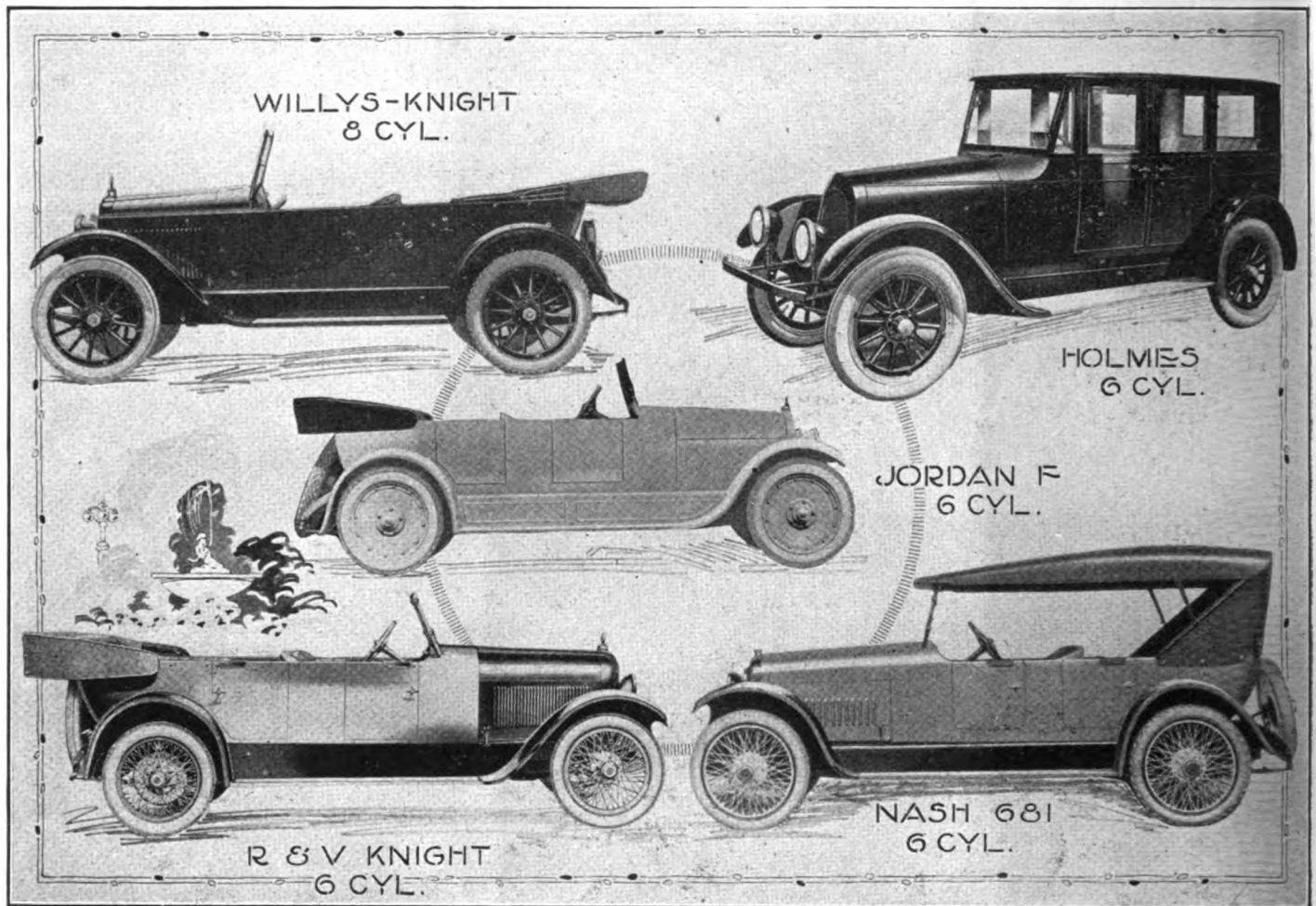
COMMONWEALTH 4-40



WESTCOTT C-48 6 CYL.



PAN-AMERICAN 6-48



tional output because of the almost ideal shape of the combustion chamber secured by placing the valves overhead. It is noted that this year some makers who hitherto have adhered to L and T-head types, have adopted the overhead valve engine for the first time. This was noted at the New York and Chicago shows and also new models that have just been placed on the market have utilized this type of valve action. It is estimated that the proportion of American cars now built which are employing this type of engine is approximately one-third.

The old complaint that the overhead

valve was objectionably noisy can no longer be brought against it, as the valve action on all the late models has been quieted to such an extent that they cannot now be considered a disturbing element even by the most fastidious.

It is also noted that the older overhead valve engines have been redesigned and improved so as to obviate noise in operation, this being accomplished particularly by a change in the lubrication methods.

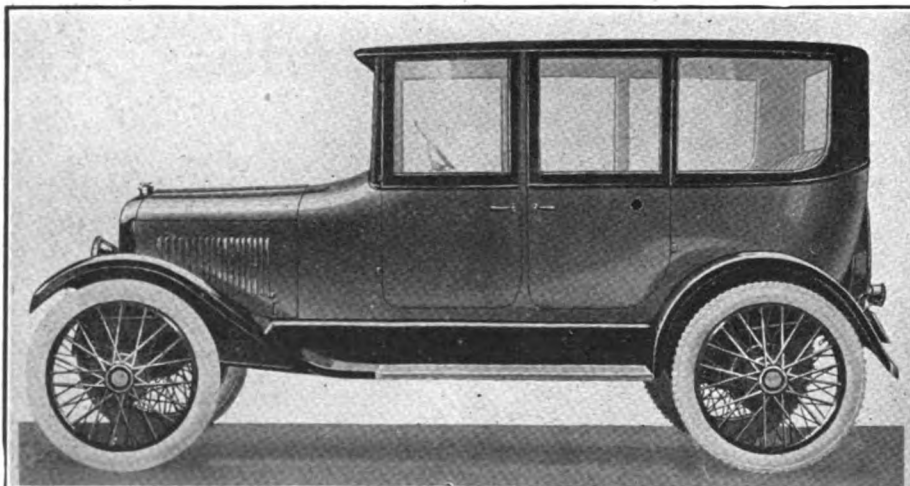
Some of the newer types have an opening from the head of the engine straight down to the crankcase, allowing the mist of oil always present in this part of the

engine to circulate around the valve action. Two makes of cars in particular have designed special oil leads to take care of the lubrication of the valve rocker arms, or the parts which are over the cylinder heads and which rock against the valve stems to open the valves. One type is featured by the fact that the valves can be adjusted for clearance while the engine is running.

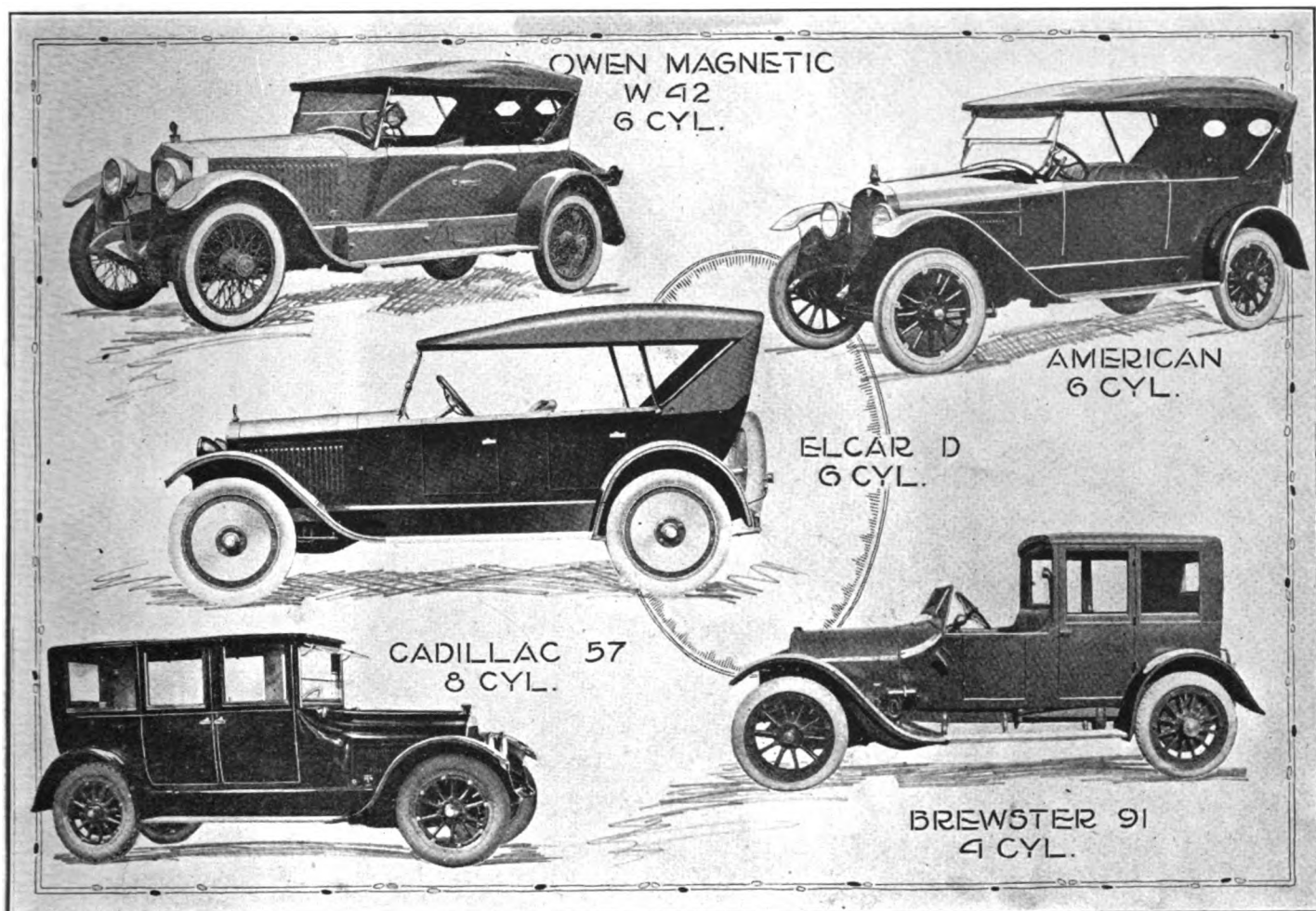
Overhead Valve Almost Ideal.

The overhead valve action in combination with the detachable cylinder head type is considered by many designers to provide an almost ideal combination. With the detachable cylinder head it is possible to include the entire valve assembly, the valves, springs, operating mechanism, etc., in such a way that when the head is detached the entire mechanism is demountable with it. With this arrangement it is a simple matter to grind the valves on a bench, or some other part of the shop where the work can be done in good light and at the convenience of the operator. This is in contrast with some types of engines where it is necessary to work under very adverse conditions in grinding valves.

In engine construction the form of having the top half of the crankcase integral with the cylinder block and the lower half of pressed steel, instead of aluminum, which was introduced on the lower priced cars, is becoming standard on higher priced lines, probably to some degree as a matter of economy in construction. The fact that steel rusts readily is a minor objection in a crankcase



Overland Four Sedan with New Three-Point Cantilever Spring Suspension, Increasing Spring Base to 130 inches.



which is sufficiently protected by a film of oil.

In the matter of lubrication it is stated that the force feed system is constantly gaining on the splash, the use of which was almost universal a few seasons ago. Fully a third of this year's passenger cars have the force feed. Several minor defects in this system are being gradually eliminated. For instance, the tendency to supply too much oil to the bearing surfaces when the engine is being run light at considerable speed, is obviated in the case of the Marmon by a by-pass operated by suction which relieves the pressure from the oil feed when the throttle is nearly closed. On the Pierce-Arrow two relief valves are fitted, one of which has only a light spring and by its small opening gives partial relief. The Chalmers also employs a relief valve, which is automatically controlled by the accelerator pedal.

For the ignition system the use of batteries is becoming well-nigh universal practise. It is noted that there is a tendency to place the ignition unit at the rear end of the power plant, it being driven from the rear end of the camshaft. It is stated that this location protects it from the moisture drawn by the fan through the radiator in wet weather, and also that it tends to simplify the arrangement of the control connections and the cables to the switch and battery.

An automatic or spring tensioning device was formerly used to overcome the trouble sometimes met with in fan belt

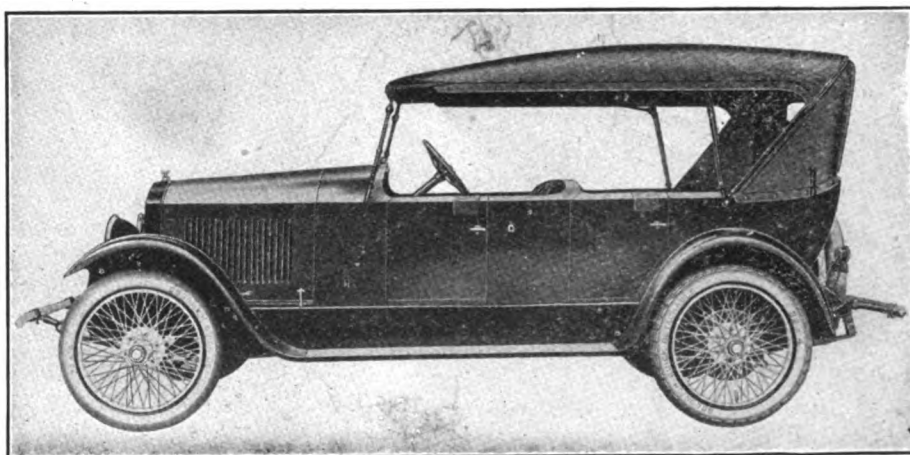
adjustment for tension held entirely by friction which was apt to work loose and require frequent attention. This season the tendency is towards a positive adjustment which when once set cannot work loose.

The use of the transmission brake is growing in favor particularly on the more moderately priced cars, among the new lines thus fitted being the Briscoe, Jackson, Lexington and Maxwell. On cars with unit power plants, the brake pedal is located in such proximity to the transmission brake that a compact and simple operating linkage is possible.

The transmission brake makes for economy of construction in that a single

member is more simple and cheaper to build than a double one, especially so if it acts on a high-speed shaft, which allows the use of parts relatively lighter in weight. The brake equalizer is done away with and the chance of rattling noises is obviated to a considerable extent. The objection that the lining of a transmission brake requires more frequent renewal than would a set of hub members, in that the drum revolves at higher speed and the area of the brake surface is less, is counteracted by the fact that it costs only about half as much to reline a single brake.

Pedals are now practically all designed with an idea to adjustability, but there

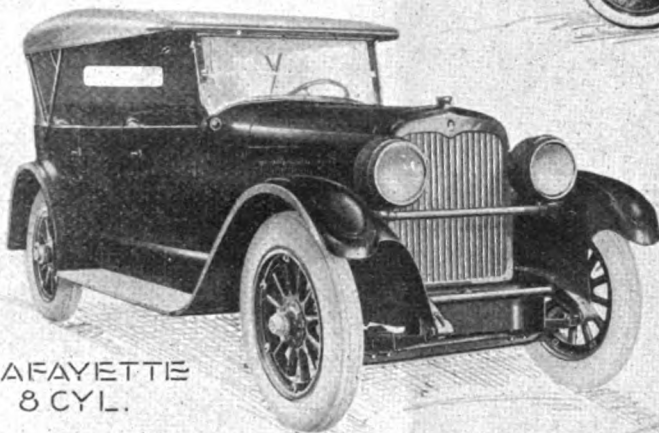
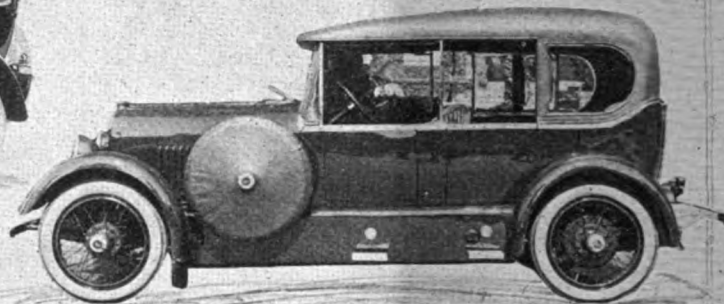


Metz Master Six Chassis with Five-Passenger Touring Car Body and Complete Standard Equipment.



STUDEBAKER E-G
6 CYL.

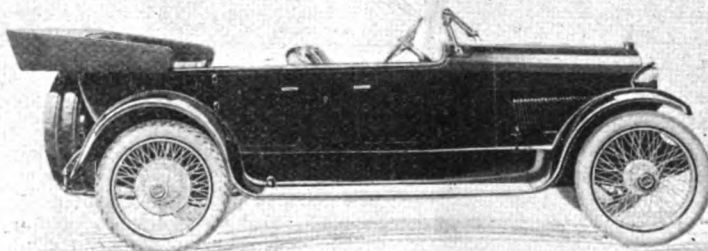
LEACH
6 CYL.



LAFAYETTE
8 CYL.



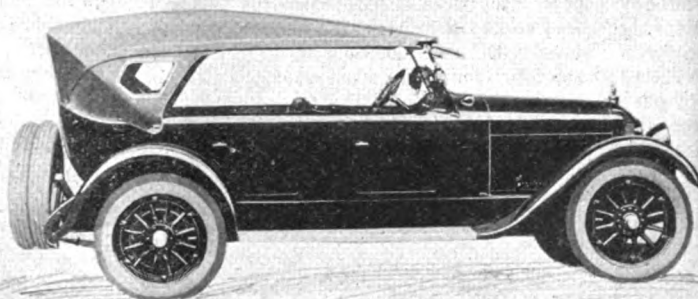
AUBURN BEAUTY
6 CYL.



CASE
6 CYL.



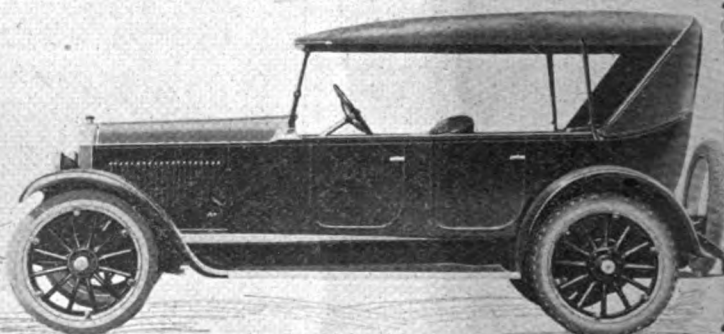
DU PONT A
4 CYL.



PREMIER D
6 CYL.

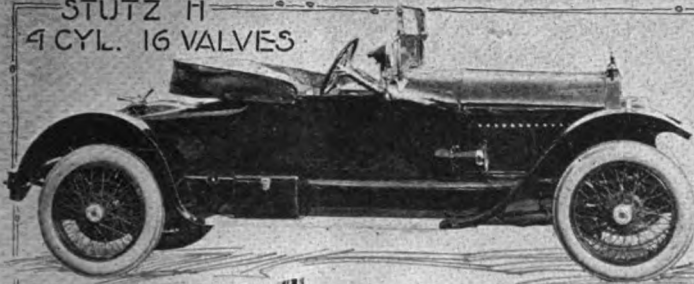


FERRIS
6 CYL.

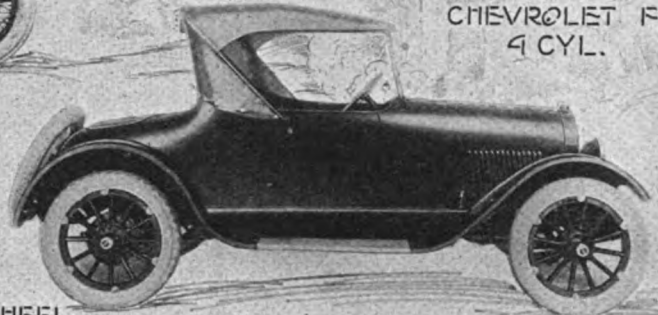


SCRIPPS-BOOTH B-39
6 CYL.

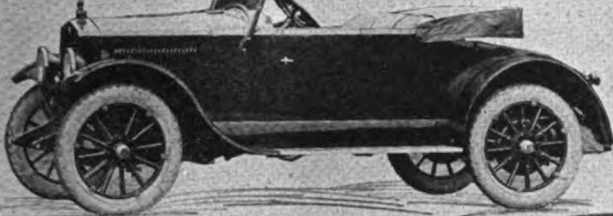
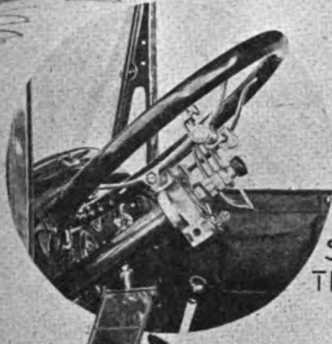
STUTZ H
4 CYL. 16 VALVES



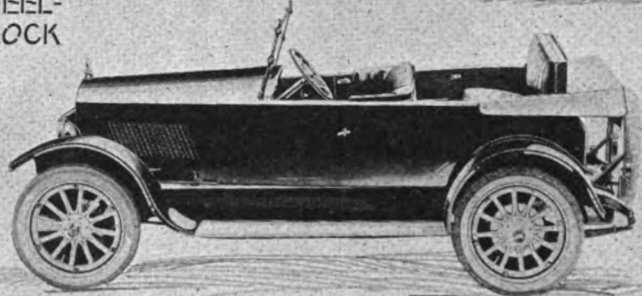
CHEVROLET FB
4 CYL.



LEACH AD-
JUSTABLE
STEERING WHEEL-
THIEF-PROOF LOCK



ESSEX A
4 CYL.

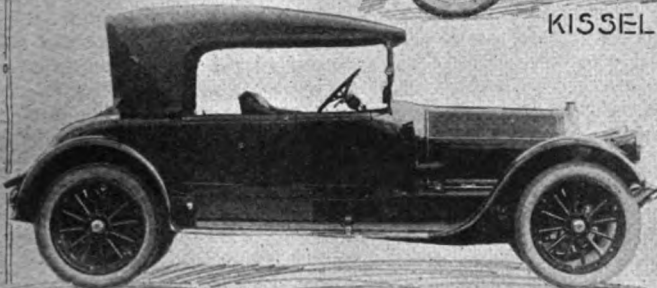


ANDERSON S-30
6 CYL.

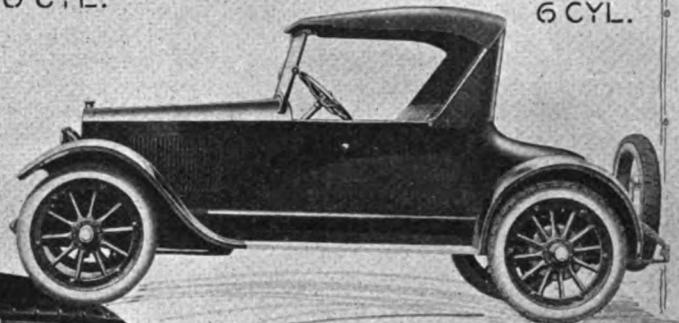


KISSEL 6 CYL.

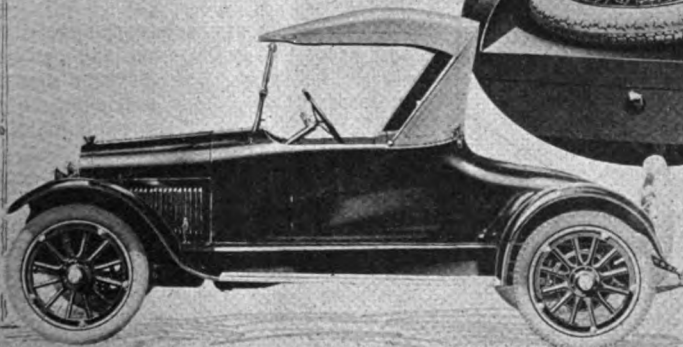
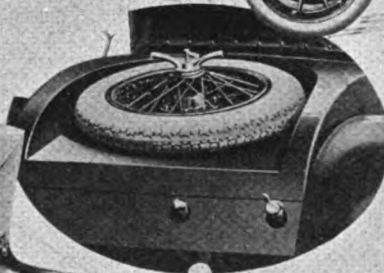
CLEVELAND
6 CYL.



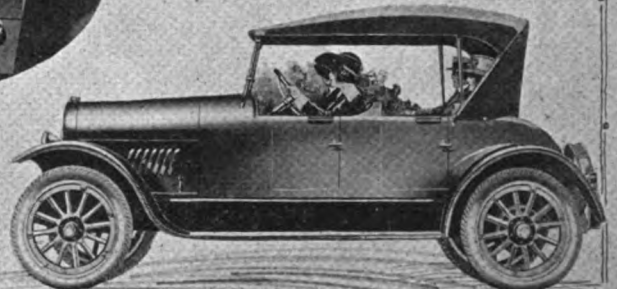
PIERCE-ARROW 48-B-5
6 CYL.



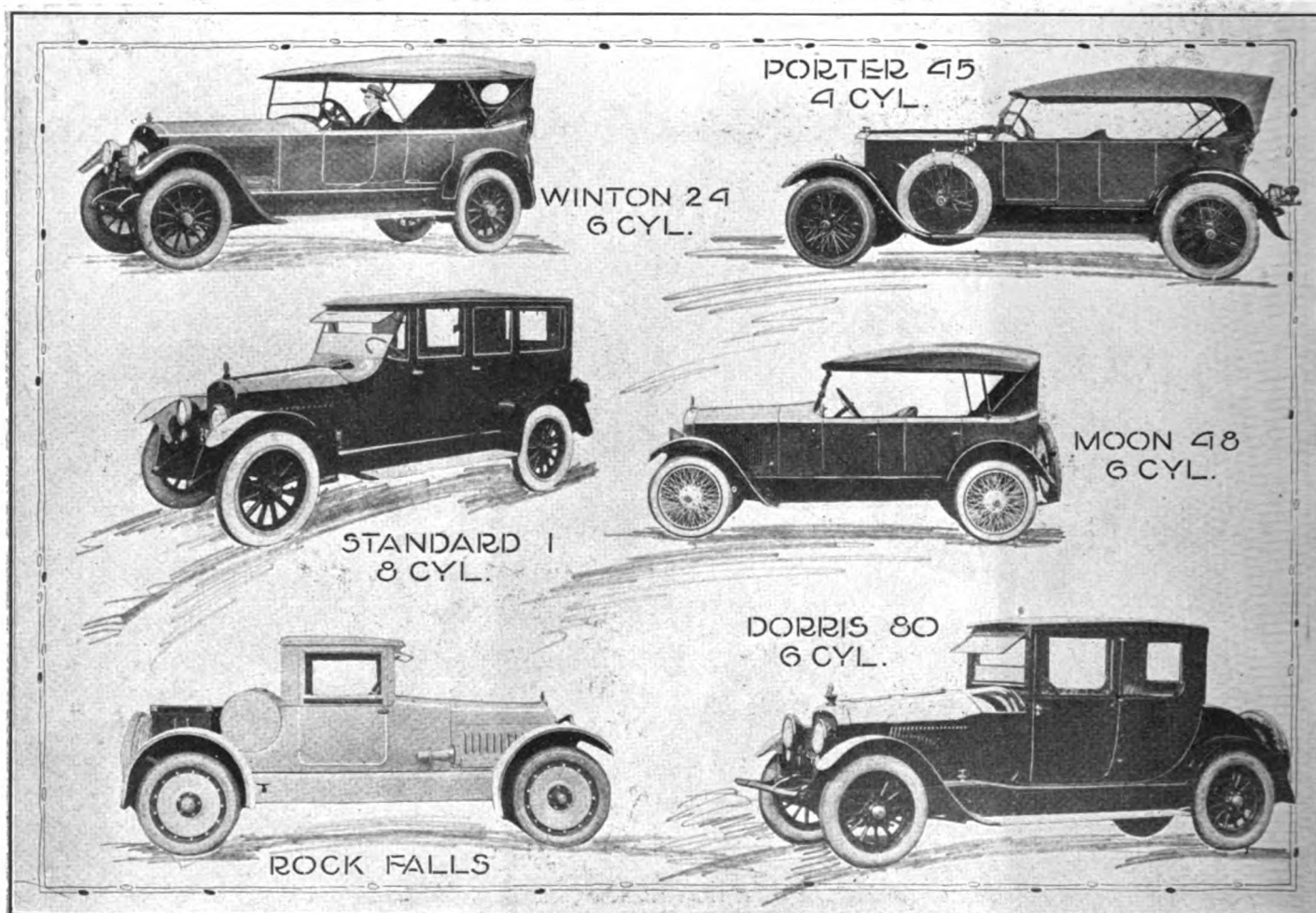
SPARE WHEEL CARRIER-
KING ROADSTER



MAXWELL 25
4 CYL.



PILOT 6-45



is not yet manifested any particular standardization of shapes either in pedals or pads. One type that appears particularly efficient was that in which the pad is supplied with a threaded shank, which screws into a hole at one end of the pedal crank and is fastened in by a lock nut.

Heavier frame sections are still further coming into use, this being perhaps partly due to the increased popularity of enclosed models which require a more rigid construction, and this is accomplished by making the side frame members of deeper section.

In conclusion it may be stated that a

general summing up of the points of excellence throughout the entire construction noted by an examination of the 1920 models and a comparison with those of previous seasons, would seem to indicate that there is an apparent desire and pride on the part of the manufacturer to approach as nearly as possible, in design, selection of material and standard of workmanship, the ideal motor vehicle.

THE NEW PATERSON SIX.

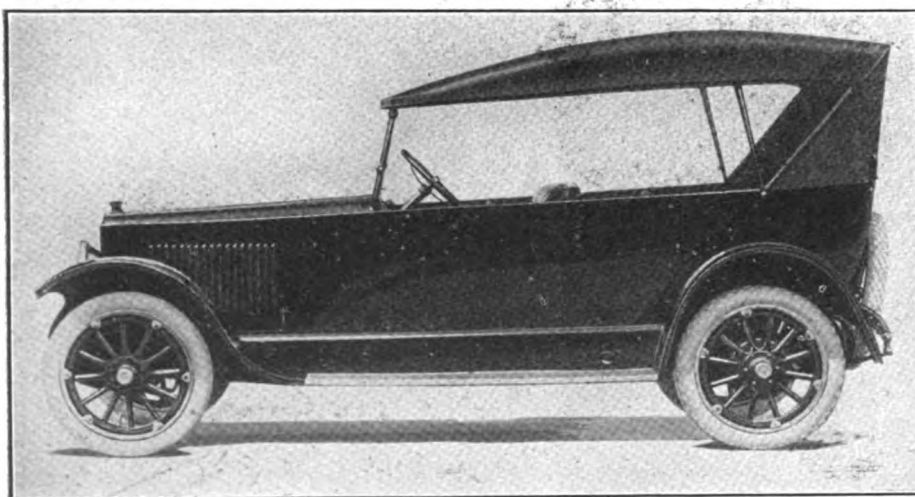
For years the W. A. Paterson Co., Flint, Mich., has specialized in produc-

ing a six-cylinder car that would cater to the popular fancy as regards body design, which is, withal, economical of operation, extremely flexible, and affords a big surplus of power above the needs of ordinary travel. In accordance with this established Paterson policy the company is producing this year but one chassis model for the touring car, and is able to supply it in both five and seven-passenger capacities by the addition of two tonneau seats for the latter. The touring model is a seven-passenger car in size and appearance, but can be furnished either with or without the two disappearing seats. By this arrangement those who wish a five-passenger car can have a spacious tonneau allowing plenty of leg room, as well as storage space for luggage.

To properly appreciate the excellence and beauty of a Paterson, the car itself should be seen. The cleverly designed radiator, straight lines, soft curves of the cowl, rakish slant of the windshield, the color scheme of blue and black, the gypsy curtains, the plate glass, rear vision windows all add to its appearance.

The power plant is the well known proven Paterson-Continental Six, which combines power, endurance and accessibility of parts. Other distinctive points of construction are the Paterson rear axle, the Paterson brake construction and the Borg & Beck dry plate clutch.

The five-passenger touring car is listed at \$1795, with \$30 extra equipped with seven-passenger seats. An attractive sedan model is also made at \$2700.



New Paterson Six Touring Car, Either for Five or Seven Passengers.

FORMER WINNERS TO PARTICIPATE IN 500-MILE RACE.

One of the most interesting features of the eighth annual international 500-mile sweepstakes on the Indianapolis speedway May 31 will be the fact that the five consecutive winners of the event since 1913 will be among the contestants for the big cash purse of \$50,000.

In 1913 Jules Goux came from Europe with a Peugeot and captured the third annual classic with an average of 76.92 miles per hour.

Rene Thomas followed him in 1914 with a Delage car, winning the event at an average of 82.47.

Ralph DePalma, one of the most popular of all race pilots, established a record for the 500-mile race in 1915 that has not been equaled up to this time, driving a Mercedes car for 500 miles at the rate of 89.84 miles an hour.

The year before the suspension of racing on account of the war the distance was reduced to 300 miles and this race was captured by Dario Resta, driving a Peugeot, which made the second victory for this make of car, the average being 83.26.

In 1919 the distance was again 500 miles and Howard Wilcox established the third winning for the Peugeot factory, his average time being 87.95 miles an hour.

Incidentally, it may be said that the only 500-mile race winners not expected to be entered in the coming event are Ray Harroun, who won the first race in 1911 at the wheel of a Marmon, and Joe Dawson, who drove a National to first place in the 1912 race. Both have retired from the racing game.

The seat sale opened on Feb. 2 with a record breaking demand and the number of reservations made by parties in all parts of the United States indicate that not many of the race fans are going to miss this great event.

CLEVELAND "SIERRA PIONEER."

An "altitude" record was recently given the Cleveland Light Six car, made by the Cleveland Automobile Co., Cleveland, O., by its San Francisco dealer, Peacock, Alexander & Hunter Co. A member of the San Francisco organization drove a stock car up the Placerville lake road in the California Sierras to the summit of the highway, which is 7630 feet above sea level. The car finished with a perfect score and has been christened the "Sierra Pioneer."

ENDURANCE RECORD FOR FRANKLIN CAR.

Harry G. Thomas, driving Franklin touring car, made by the H. H. Franklin Manufacturing Co., Syracuse, N. Y., made a new record for endurance runs recently, under adverse weather conditions, by covering 532 miles in 13 hours and nine minutes, at an average speed of 40.45 miles an hour.

Important Records Made in Racing Events During the Year Just Past

MANY important records in connection with automobile racing events were made during the year 1919, the principal of which were as follows:

February 12—Ralph De Palma, at Daytona Beach, Fla., set two world speed records: One mile in 24:02. 149.87 miles per hour or 215.65 feet per second; one kilometer in 15:36.

February 16—Ralph De Palma, driving a Packard special 12-cylinder aviation engine of 905 cubic inches piston displacement, set these world records at Daytona, Fla.: Two miles in 49:54; three miles in 1:15:04; four miles in 1:39:77; five miles in 2:04:58; 10 miles in 4:09:31, and 20 miles in 9:21:41.

February 17—Ralph De Palma set these world records at Daytona, Fla.: Fifteen miles straightaway in 6:48:75; 20 miles straightaway in 8:54:20, and one mile, standing start, in 0:38:83.

March 15—Santa Monica, Cal., road race, 250 miles, won by Cliff Durant in 3:04:45; average of 81.6; E. Hearne second in

mile race at Sheepshead Bay, N. Y., in 54:17½ (world record); Wilcox second and Dave Lewis third.

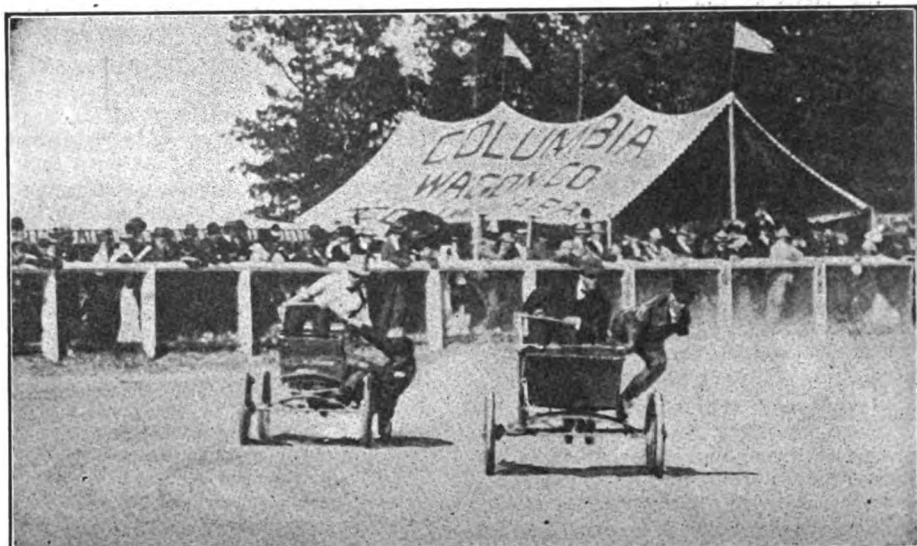
July 19—Tom Milton won a 22½-mile speed race at Uniontown, Pa., in 101.17 miles average per hour. He drove a Duesenberg; D. Lewis, Meteor, second, and Fetterman, Fearless, third.

July 22—R. J. Copes, Denver, in a Chevrolet, won the Denver-to-Cheyenne road race, under the auspices of the Denver Times, in 2:11:59; Red Myers, Hudson, second.

August 23—Tom Milton, Duesenberg, won 301-mile Elgin road race at Elgin, Ill., in 4:05:17, average of 73.5. Roscoe Sarles, Roamer Special, second, and Kurt Hitke, Roamer, third.

October 12—Auto sweepstakes, 250 miles, at Cincinnati, won by Joe Boyer, with an average of 101.69. Art Kline, second, and Kurt Hitke, third.

November 8—Eddie Hearne won 100-mile free-for-all at Phoenix, Ariz., in 1:29:09 (claimed to be world record on dirt track); R. Sarles, second, and R. C. Durant, third.



Percy Owen, Now President of Liberty Motor Car Co., Making a Fast Turn in Racing Event in 1903.

3:11:95; Louis LeCock third in 3:15:28, and Eddie Pullen fourth in 3:20:40.

May 19—Victory sweepstakes, 112 miles, at Uniontown, Pa., won by Tommy Milton in 1:10:09:32, average of 96½; Louis Chevrolet second and Ralph Mulford third.

May 31—Five hundred miles, \$50,000 national sweepstakes, at Indianapolis; won by H. Wilcox, Peugeot, in 5:44:21:75, average of 87.12; E. Hearne, Durant, second, in 5:46:16:05; Jules Goux, Peugeot, third in 5:50:29:90; A. Guyot, Ballot, fourth, in 5:53:33:50, and Tom Alley, Bender, fifth in 6:06:54:85.

June 14—Results at Sheepshead Bay: Fifty miles, won by R. De Palma, Packard, in 26:23 1/5, average of 114.5; Joe Boyer, Jr., Frontenac Special, second, and Dave Lewis, Meteor, third. Ten miles, won by Tom Milton, Duesenberg Special, in 5:20 1/5; R. Mulford, Frontenac Special, second, and R. Resta, Resta Special, third. Thirty miles, won by Mulford in 16:20 3/10 (world record); De Palma, second. Ten miles, won by Mulford in 5:24 1/5; Boyer second and De Palma third.

July 4—Ralph Mulford won a 40-mile race at Tacoma, Wash., in 24:02 2/5; Durant second, Chevrolet third, Hearne fourth and Resta fifth. Louis Chevrolet won a 60-mile race in 36:47 1/5; Mulford second, Hearne third, Durant fourth and Resta fifth.

July 4—Gaston Chevrolet won a 100-

THE RACING GAME AS IT WAS 17 YEARS AGO.

The accompanying illustration affords a glimpse of the racing game as it was in the earlier days of the automobile. In the right hand car is Percy Owen, now president of the Liberty Motor Car Co., Detroit, but at that time branch manager for the Winton company in New York City.

Mr. Owen was then an internationally known racing driver, holding world records in 1901 and 1902 for all distances from one to 10 miles. The picture here shown was taken during one of his races on Long Island in 1903. The figure at his left is the mechanic who, it will be noted, had to serve also as counterweight when rounding the turns at high speed.

INAUGURAL FOR NEW SPEEDWAY.

The inaugural event on the new speedway being built for the Los Angeles Speedway association, near Beverly, Cal., will be held on Feb. 22.

Dodge Car Operating Alaskan Railroad

The motive power of what is said to be one of the "farthest north" railroads of the world, is a 1916 Dodge car, made by Dodge Brothers, Detroit. This railroad is owned and operated by O. P. Gaustad of Fairbanks, Alaska, and consists of 15 miles of wooden rails connecting the head of navigation on the Tolovana river with the rich placer mines above, which are located 75 miles from Fairbanks.

Mr. Gaustad operates a saw mill half way between the Tolovana placers and uses the railroad to haul logs to the mill and from there the sawed lumber to the mines. The Dodge Brothers car is equipped with flanged wheels and hauls a train of three cars. Loads as high as six tons have been pulled without trouble, Mr. Gaustad reports, and in addition to the lumber all supplies are conveyed from the head of navigation on the river to the mines, and the transportation tariff is \$60 a ton. Sometimes eight or nine trips a day are made and the past year the total mileage was over 6000. The gasoline costs 85 cents a gallon and the average is 15 miles a gallon even with the heavy loads.

Mr. Gaustad states that with the advent of better roads, Alaska will become a great market for motor cars and trucks, for transportation is the greatest need at present in that section.

PURITAN GIVES FREE INFORMATION.

The Puritan Machine Co., Lafayette boulevard and 10th street, Detroit, has received so much correspondence from motorists throughout the country in reference to car troubles, that it has found it necessary to inaugurate a "motor trouble" desk. This is in charge of experts thoroughly familiar with "orphan" cars and motor trouble of every description, and any motorist who is in need of information may write to the "Motor Trouble Desk" at the Puritan Machine Co.'s address and they will be answered free of charge.

TWO SHOWS AT ST. LOUIS.

There will be two automobile shows at St. Louis this year, both under the auspices of the St. Louis Automobile Manufacturers' and Dealers' association, and held at the same time, the week of Feb. 16 to 21. The passenger car and accessories displays will be held in the Southern Hotel building, while the commercial cars will be exhibited in the Coliseum building.

There will be one admission for both divisions, and there will be free transportation by motor busses between the two buildings. Robert E. Lee, Ninth and Walnut streets, St. Louis, is manager.

The annual dinner of the Society of Automotive Engineers during the Kansas City Tractor Show will take place this year at the Hotel Baltimore in that city the evening of Feb. 19.



Ralph S. Lane, President of United Motor Service, Inc., and Bearing Service Co., Detroit.

LANE VISITS PACIFIC COAST.

Ralph S. Lane, president of the United Motor Service, Inc., and the Bearing Service Co., Detroit, is making a tour of inspection of the Pacific coast branches of those companies, located at San Francisco and Los Angeles, Cal.; Portland, Ore., and Seattle, Wash.

The United Motor Service, Inc., is the official service department of Delco, Klaxon and Remy products, and has 22 branches and 137 authorized distributors. The Bearings Service Co. is the national service department of the Hyatt, Timken and New Departure companies, and has 26 direct branches and more than 900 authorized distributors.

GEMCO 1920 CATALOGUE.

One of the most interesting of the 1920 automobile supply catalogues is that just issued by the Gemco Manufacturing Co.,



Milwaukee, Wis., which illustrates and describes a large number of popular and successful devices for motor cars. Especially notable is the complete line of bumpers for all cars.

It contains a double cross reference index, which renders the finding of either descriptive matter or illustrations a very simple matter, as the makes of automobiles are listed alphabetically and opposite the names appear the numbers of the pages on which the bumpers for the cars are shown. This catalogue will be sent free to anyone interested.

The time for deposit of stock of the Maxwell Motor, Inc., and Chalmers Motor and of the six per cent. five-year gold notes of Chalmers has been extended to April 30.

Haynes Co. Buys New York Property

The Haynes Automobile Co. has bought the two-story buildings in the automobile section, 1715-1717 Broadway, New York City, having a frontage of 51.8 feet, adjoining the northwest corner of 54th street. The Haynes Co. has been for some time a tenant of this property, which is a portion of the estate of Cardinal Farley. The price is said to have been close to \$200,000.

FRANKLIN CO.'S BAND.

One of the best known musical organizations in central New York is the band of the Franklin Automobile Co., Syracuse, which consists of 40 pieces and is made up entirely of Franklin employees. This is a workman's proposition from start to finish and is maintained and conducted by the Franklin Musical association. Among its activities are noon day concerts in the factory yard twice a week during the summer months and in one of the factory buildings in cold weather. It also recently staged a successful minstrel show and conducts every winter a series of dancing parties in the State Armory.

The director of the band is Charles F. Partello, who has gained considerable notice as a composer as well.

MANY DRIVE-AWAYS FROM COLUMBIA PLANT.

Driving cars overland from the factories, which was originally inaugurated as a war time emergency measure, has now become a recognized method of year-round delivery by many manufacturers. This is exemplified by the fact that during the last week of January, one of the worst for poor weather ever experienced in the middle west section, the Columbia Motors Co., Detroit, maker of the Columbia Six, reports nine big dealer drive-aways from its plant in that city. Among the points to which shipments were made in quantity by this method were Buffalo, N. Y.; Pittsburgh, Pa.; Indianapolis, Ind.; Chicago, Ill.; Cincinnati, Dayton, Cleveland, Columbus and Toledo, O.

INDUSTRIAL ENGINEERING SYNDICATE FORMED.

The Industrial Engineering Syndicate has been formed at Detroit with Benjamin Briscoe as its head, and with him is associated Rodolphe Stahl, who is in charge of the technical division. This organization claims to have developed a plan to eliminate the hazards of manufacturing and financing, combining the safe employment of capital with a satisfactory earning capacity. The syndicate has brought out a four-cylinder car which is designed with especial attention to simplicity of construction, durability and service, and to represent the latest trend of the American car and to be adapted for assembly at various points.



Maxton R. Davies, Vice President Advertising House of Seelye & Brown, Inc.

Davies Vice President Seelye & Brown

Maxton R. Davies, formerly vice president and secretary of the Dunlap, Ward Advertising Co. and manager of that agency's Detroit office, has returned to Detroit to become vice president of Seelye & Brown, Inc., advertising agency, where he will serve as counsel on automotive advertising and sales. Mr. Davies is well known in the automobile and allied industries, having been prominently identified with the publicity work in behalf of the Chandler, Cleveland and Grant motor cars.

STORM WITH SEWELL WHEEL CO.

The Sewell Cushion Wheel Co., Detroit, has appointed Fred J. Storm assistant general manager. Mr. Storm has been closely allied with the motor truck industry and is therefore well equipped to take



F. J. Storm, Assistant General Manager, Sewell Cushion Wheel Co.

over his new duties, which will place him in complete charge of the merchandising of Sewell cushion wheels.

PEERLESS STORAGE BATTERY CHANGES NAME.

The Peerless Storage Battery Co., Louisville, Ky., maker of the Peerless Red Cap storage batteries, has changed its firm name to Wolke Lead Batteries Co. and has registered the name "Wol-kee Red Cap" for its starting and lighting battery. This action was taken on account of the fact that another battery had been put on the market under the name "Peerless," so it was decided to omit that designation entirely as applying to the company's product and substituting "Wol-kee Red Cap," which is particularly appropriate, as the Wolke company's lighting and starting batteries have always been distinguished by the red rubber vent caps.

The Wolke Lead Batteries Co. is making rapid progress in equipping the addition to its No. 2 plant, and when completed will have over 75,000 additional square feet of floor space, which will permit of increasing its output to 750 completed batteries a day.

APCO OPENS COAST BRANCH.

The Apco Manufacturing Co., Providence, has announced the opening of a Pacific coast branch at 451 O'Farrell street, San Francisco. It will be in charge of C. G. Dippel, for a number of years with Chanslor & Lyons, and later with the M. & M. Co., Cleveland, as branch manager, who has had a long experience in the automotive equipment industry.

WILL BUILD ADDITION TO FEDERAL.

Work has been begun on a large addition to the plant of the Federal Bearings Co., Poughkeepsie, N. Y., which will be completed by the end of winter, and which is expected to increase the production more than 100 per cent. The company is to double its resources by increasing its capital from \$1,000,000 to \$2,000,000. The business of the company has developed very rapidly and continuance of this growth is believed will justify the expansion.

FRIEND FORMS NEW CORPORATION.

Otis C. Friend, one of the best known personalities in the automobile industry, announces the organization of the Friend Motors Corporation, with factories at Pontiac, Mich. Mr. Friend and his associates have purchased the plant and equipment of the Olympian Motors Co. and will continue to make the Olympian car pending the development of a new model which will embody Mr. Friend's ideals. Mr. Friend recently resigned as an executive of the General Motors Corporation. He has had a unique career as designer, engineer, production manager, sales executive and president, holding the latter position with the Mitchell Motors Co.



E. J. Berlet, New President of the Philadelphia Motor Truck Association.

Berlet President Truck Association

The Philadelphia Motor Truck association has elected as president for the ensuing year E. J. Berlet, who is well known as the president of the Stability Motors Co., Philadelphia, agent for Atterbury trucks. Mr. Berlet is known as one of the most active interests in the trade and keenly concerned in the success of the annual auto show in that city, which took place this month. His company has taken a prominent part in various public promotive movements in Philadelphia.

E. A. Bates, who is well known in the carburetor manufacturing industry, has become president and general manager of the Booty Carburetor & Manufacturing Co. Mr. Bates was formerly associated with Benecke & Kropf.



Otis C. Friend, President, Friend Motors Corporation.

(Photo by Underwood & Underwood Studios, N. Y.)

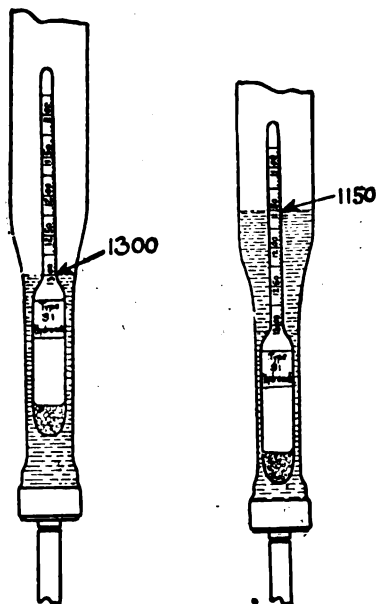
Engine Trouble Prevented by Foresight and Prompt Attention to Weak Points

NEARLY every motorist can fix troubles in car after he knows where they are located, but talent and knowledge are required to foresee and prevent their occurrence.

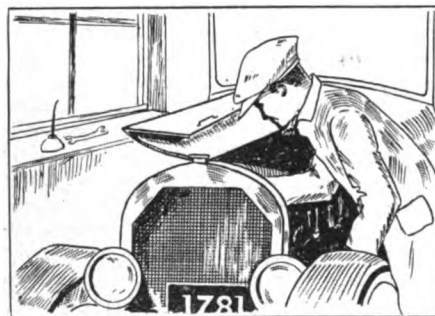
One of the most important matters to watch about the car is the condition of the valves. Most cars are now started by battery through the use of the electric motor, but the crank should be inserted occasionally to test the "feel" of the compression in each cylinder, and the valves should then be ground if they show the least signs of leakage. Be sure that the engine is warm before testing the compression, as sometimes the valves are held off their seats by the expansion of the valve stems. Note if the space between the valve tappet and valve stem is sufficient for this expansion. The engine should be warm when this is done to get the same results as under operating conditions and the space between tappet and valve stem should not exceed .002 to .004 of an inch, or about the thickness of a thin business card. If the space is much more than this the valve mechanism will become noisy; if much less the valves will remain open and leak when they should be closed tightly. It will usually be found necessary to follow up the wear in the valve opening mechanism more closely when the engine is new than after it has been run a time. After the adjustment has been made see that the lock nuts are securely fastened so that they cannot work loose while on the road.

Dress Up Points of Circuit Breaker.

Dress up the points of the circuit breaker at least once a month, as they easily become corroded and will not then make a good contact. This assures that the primary current will always flow and cause the secondary coil to give a good hot spark. This can be done by drawing



Gravity Test of 1300 Indicates Battery Is Fully Charged. Reading of 1150 Indicates Battery Is Fully Discharged and Must Be Recharged at Once.



When Locating Defects in Engine, Search Systematically.

a piece of No. 00 sandpaper through the gap when the points are closed. At the same time make sure that the points are spaced properly and that the spring is of good strength. Manufacturers of each line of cars provide a gauge with each tool kit, having strips of metal the proper thickness, marked for gauging the contact points of the breaker and the spark plugs.

Watch Storage Battery.

Keep a sharp watch of the storage battery. The electrolyte must cover the plates at all times. Add distilled water every two weeks in winter and every week in summer. Test the battery every week, making sure that the specific gravity stands at 1.275 or over. If it goes below this figure ascertain whether you are using the lights and starter too much, thus overworking the battery. If this is not the reason there is probably trouble in the charging system, which must be found and remedied.

The ammeter is the pulse of the whole electrical system and a close watch should be kept upon it. At some specific date note carefully what amperage is going to the battery at various speeds of the engine. Then if in subsequent tests the ammeter registers differently at the same test speeds, find out why.

Minor Hints.

Keep a supply of inner tubes in the car with the repair kit, a jack, tools of all kinds and skid chains. Keep the tire on the spare rim fully inflated. Keep all the joints in the vacuum system tight. Learn the simple tests and adjustments necessary to keep the carburetor at its maximum efficiency and when once the carburetor has been properly set, leave it alone, for if trouble does occur and the engine misses, nine times out of 10 it is the fault of the ignition and not the carburetor.

BETTER INVESTIGATE.

When you hear a clatter as though you had run over a tin can or some other piece of metal, do not be so optimistic as to think it did not fall off the car, but stop, go back and look carefully. One motorist lost a license tag in this manner; another two good wrenches and a tire pump, while still another lost a spare tire. Better be on the safe side and investigate.

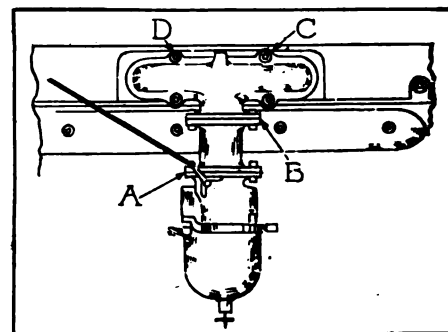
WHITEWASH FOR GARAGE INTERIORS.

Nothing brightens up the interior of a dingy garage like a good coat of whitewash. Poorly prepared whitewash flakes off soon after being applied. The United States government standard receipt is probably the best there is.

Slake one-half bushel of unslacked lime in boiling water, keeping the lime covered during the process. Strain and add a peck of salt dissolved in warm water. Add also three pounds of ground rice boiled to a thin paste and $\frac{1}{2}$ pound of Spanish whiting. Dissolve one pound of clear glue in water and add. Mix whole thoroughly and let stand for several days. When ready to apply, heat thoroughly and apply as hot as possible.

TO STOP AIR LEAKS.

The usual remedy for valve stem guides in the Ford engine that are worn and allow compression to leak, is to renew the bushing or ream out the guide and supply new valves with over-size stems. Another method is to fit felt washers at the bottom of the valve guide, holding them in place by an auxiliary spring, placed inside the regular valve spring. As



A, B, C, D—Points on Intake Manifold Where Air Leaks May Occur.

this spring is smaller than the valve spring it should fit easily over the valve stem, with sufficient tension to hold the felt washers in place and not to interfere with the action of the valve spring.

The felt washers can be obtained by cutting from the side of an old felt boot, or they may be made from washers that have become oil soaked.

Another method of holding the washers in place is by using light metal clips, which hook over the tops of the valve springs.

BENDING BRASS AND COPPER TUBING.

It is ordinarily next to impossible to bend brass or copper tubing over $\frac{3}{8}$ inch without flattening the tube or cracking it. To successfully bend tubing of this type, it should first be filled with melted lead or sand. When so loaded bends of any desired shape can be easily made.

It is necessary to first anneal the tube by heating it to a dull red and cooling it in cold water. The lead is melted and poured into the tube. After the lead has set the tube is fixed in a vise, a broom handle fastened to the free end supplying necessary leverage and tube bent.

WIRE BRISTLE BROOMS NOT SATISFACTORY.

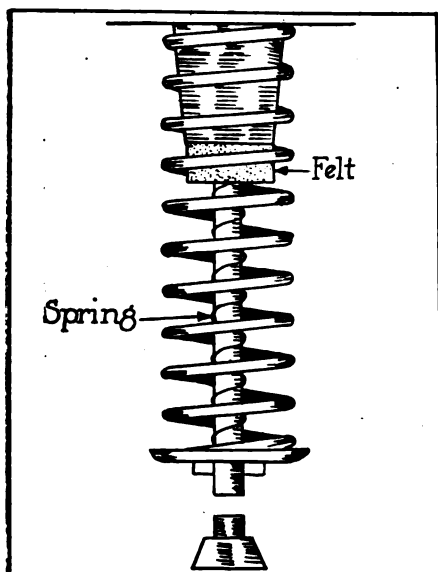
The use of wire bristle brooms for sweeping garage floors, especially cement floors, is not to be recommended, for recently a bad garage fire was caused in Modesta, Cal., by using this type of broom. Sawdust, some of which was saturated with distillate, was being swept with a wire broom from the oil room floor of this garage. According to an eye witness a spark was struck from the wire broom and immediately the oil room was a mass of flames. The fire spread rapidly to other parts of the garage and soon the entire building was in flames, causing the destruction of 30 automobiles and a property loss of nearly \$100,000. So swift was the spread of the flames that one driver, caught with a new car on the incline to the second story, was compelled to abandon the machine and make his way to safety with the aid of a fire extinguisher. Firemen rescued persons cut off from the stairway on the second floor.

FRICTION IS CAUSE OF CLUTCH SPINNING.

Clutch spinning is often due to excessive friction in the spring thrust bearing, though sometimes faulty alignment of the flywheel and clutch cone prevent the engaging surfaces from entirely clearing each other. A bent clutch shaft might also cause the trouble.

MISFIRING FROM AIR LEAKS.

Air leaks are a common cause of misfiring, though often overlooked, and may occur at either of the two joints of the intake manifold, at the carburetor or flange connection where the intake manifold joins the engine. A worn valve guide will allow enough air to be drawn into the cylinders to cause misfiring, at the same time permitting oil to leak out from the cylinders. If oil is discovered leaking out on to the valve stems, it is fair to assume that excess air is being sucked into the fuel charge.



Method of Fitting Felt Washer Below Worn Valve Stem Guide.

Care in Washing and Cleaning Car Necessary in Keeping Body Finish Fresh



Use Small Stream of Water in Washing Car or Rinsing Off Mud and Dirt. Dissolve Soap in Pail of Water, Warm in Winter and Cold in Summer. Rinse Off Soon After Applying.

IF THE owner desires to keep his car slightly as long as possible, the utmost care must be taken when washing it, for in careful cleaning lies the secret of preserving the body finish.

When the car is first painted it is given a coat of flat color and finished with several coats of varnish. All but the last coat are rubbed down to make a body for the last or finishing coat. This final finish must be protected to preserve the appearance of the car.

If mud or road oil is allowed to remain on the finish for any length of time the varnish will become spotted. One should obtain a large, soft sponge of good quality, free from pieces of coral, for washing the body; a smaller sponge for washing the running gear, which need not be of as good quality; a pail of auto soap, free from alkali, a good grade of linseed oil soap is best; a large water pail, a length of hose and a piece of chamois skin.

As a preliminary the car is gone over with a stream of water from the hose, and a light spray will soften the mud and wash off much of the mud and grit.

A good lather of soap is then made in the pail and with the large sponge and suds the car body is gone over thoroughly, rubbing very lightly so as not to scratch the varnish with the grit still adhering to it.

Care should be taken to play a small stream of water upon the sponge to wash the soap and the grit from the body as soon as it is loosened. The soap should not remain on the varnish more than a few seconds.

After the body has been washed thoroughly, with the smaller sponge wash the running gear. This sponge should not be used on the body, because of the grease and oil it will absorb. It should be kept for washing the running gear only. The sponge used on the body of the car should be used for no other purpose.

After thoroughly washing the car

should be flooded with clear water and dried with the chamois skin.

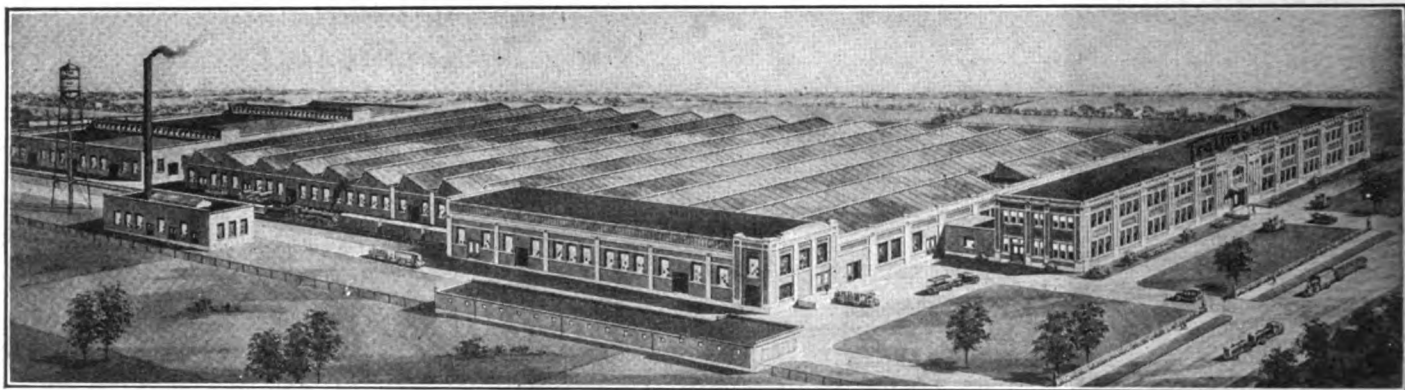
Before washing the car it will be advisable to place a water proof cover over the top of the engine. This will prevent water wetting the spark plugs short circuiting them. This care is advisable on all cars, whether the plugs are enclosed or not. Do not forget to remove this cover when the washing is finished, as it will cause damage were the engine started with it on.

It is not necessary to use soap every time the car is washed, as the soap is intended to remove oil stains or dust that water alone will not eradicate. If the car is washed often the better plan is to use clear water alone. Some owners prefer to use a wax polish on their cars after washing and drying. This method is to be commended. Others prefer to allow their cars to collect dust for a few days and then apply a body polish. For a few applications this method may give good results, but it is not to be commended for the reason that unless cleaned the dust is an abrasive and will destroy the finish. If cleaned the polish will serve a very useful purpose.

For removing spots of tar or road oil from underneath the fenders and the body, gasoline may be used with a piece of cotton waste, dampening the waste and rubbing the oil spot very lightly. Or better still, use one of the preparations that may be bought for this purpose.

A car should not be washed while the engine is hot, or the finish will be taken off the hood and radiator. A car should not be left standing in the sun, or stored in a barn, for the fumes of ammonia from a stable will attack the varnish and cause it to check and peel.

Do not step on the accelerator suddenly when the rear wheels commence to spin in soft sand, mud or snow. Engage the low gear and make the driving wheels turn as slowly as possible. They will "take hold" much better.



The New Plant of the Trailmobile Co. at Oakley, a Suburb of Cincinnati, O., Which Is to Be Used Exclusively for the Production of Semi-Trailer and Trailer Units, Claimed to Be the Largest Factory of the Kind in the World.

Trailmobile Co. Builds New Plant

The Trailmobile Co., Cincinnati, O., is just completing a large, modern factory at Oakley, a suburb of that city, which will be used for the production on a large scale of trailers of a wide variety of types. It is claimed that this will be the largest in the world engaged exclusively in the making of trailers for motor vehicles and has been planned so that extensions can be made rapidly to meet the further increasing demands of the business.

The past year has been a big one in every way for the trailer business, and especially for the Trailmobile Co. Thousands of truck owners, educated in the economies of trailer hauling by the use to which they were put by all the leading armies in the world war, have turned to it for commercial use.

Great corporations, with vast amounts of hauling to do in the cities, have taken up the semi-trailer. Fleets of 150 units or more are now in operation. Statistics in states that require registration indicate increases of as much as 170 per cent. in the use of trailers during the past year.

Since the close of the war, during which it supplied in the neighborhood of 10,000 Trailmobiles to the government, the commercial business of the Trailmobile Co. has been greatly on the increase.

JORDAN MOTOR CAR CO.

The Jordan Motor Car Co., Cleveland, O., is occupying its new plant, which has increased its capacity to three times its original space. It includes a new power plant, japanning building, a motor test building, a new assembly room and two-story warehouse.

In addition to this the Jordan company has annexed the property of the Metal Parts Manufacturing Co., which adjoins, and the incorporation of this building as a part of the Jordan plant will make possible an increase of more than 30,000 feet of floor space.

There are 2,478,552 miles of public roads in the United States, yet only 12 per cent. of this total, or 299,135 miles, are improved with hard surfacing.

BRUNNER CO. OPENS NEW OFFICE IN KANSAS CITY.

The Brunner Manufacturing Co. Utica, N. Y., maker of garage air compressors, has opened a branch office in Kansas City, Mo., with H. S. Atherton in charge as district manager. This new office will provide for more intimate contact with the trade in the central territory west of the Mississippi.

The Cincinnati branch has also been enlarged recently to afford better co-operation to its rapidly increasing trade in the central, north central and south central states.

The Brunner products include a complete line of belt and motor driven air compressors for every purpose, high-pressure air tanks and fittings and complete compressed air equipment for garages. It has recently issued a new catalogue, which may be had by application to the company.

U. S. STEEL GETS FORD ORDER.

It is reported that the lion's share of the \$15,000,000 steel contract just placed by the Ford Motor Co., Detroit, has been awarded to the United States Steel Corporation. It will be about 216,000 tons.



W. H. Metcalf, President Philadelphia Automobile Business Association.

Metcalf Heads Business Association

W. H. Metcalf, who is connected with the service department of the Wire Wheel Corporation of America, successor to the George W. Houk Co., has been re-elected for his third term as president of the Automobile Accessories Business association of Philadelphia. The other officers are as follows:

Vice president, George L. Fischer; treasurer, N. A. Petry; secretary, A. W. Stellwag; two-year directors, H. E. Alimang; George B. Shearer, Jr.; one-year directors, W. T. Bosworth, T. S. Eavenson, C. B. Vogt, W. R. Walton, C. H. Waltz.

The total membership is now nearly 300, about three times what it was a year ago, and is made up of manufacturers and jobbers of automobile accessories, dealers and their salesmen.

NEW BUILDING FOR G. PIEL & SONS.

G. Piel & Sons, manufacturer of automobile accessories, Long Island City, N. Y., has leased for a term of years a new manufacturing building, just completed by the Steinway Building Co., at Jackson and Steinway avenues, Long Island City.

The Piel company has also filed plans for the erection of a six-story and basement building, 150 by 200 feet, to occupy the block in Long Island City bounded by Seventh, Washington, Eighth and Pierce avenues. It is designed for a modern fire resistant, industrial structure, to be built of reinforced concrete with brick spangel walls and steel sash.

APPERSON CO. INCREASES PRICES.

The Apperson Brothers Automobile Co., Kokomo, Ind., has announced an advance in prices of its cars affecting all models. The new list is as follows:

Apperson Anniversary, either seven-passenger touring or four-passenger Tourster, \$4250; Standard, either seven-passenger touring, four-passenger Sportster or two-passenger Ace body, \$3250; Standard enclosed model, \$4500. All quotations are f. o. b. Kokomo and subject to war tax.



M. W. Franklin, Promoted to Important Position with Remy Electric Co.

Remy's New Director of Inspection

The Remy Electric Co., Anderson, Ind., has appointed M. W. Franklin director of the inspection, service and personnel division to succeed J. D. Hopper. Mr. Franklin has had an usually wide experience, is a doctor of science, master of arts, electrical engineer and physical chemist, holding degrees from the University of California, Columbia University and the University of Goettingen, Germany.

KISSEL DEALERS SPEND MILLIONS.

According to an estimate by officials of the Kissel Motor Car Co., Hartford, Wis., new building operations either started or in preparation by Kissel distributors and dealers in all parts of the country will aggregate an expenditure of nearly \$3,000,000 for new buildings or additions to present sales rooms and service stations.

The New York and Chicago distributors lead with a combined proposed expenditure of nearly \$750,000, and close behind them are such centers as Boston, St. Paul, Denver, St. Louis, Omaha, Cleveland, San Francisco, Los Angeles and Portland, Ore.

In the South, Richmond, Va., reports a \$40,000 building, and Salisbury, N. C., is erecting one of the largest garages in that section 400 by 800 feet, four stories, of concrete and steel.

"COMPLETE PRACTICAL MACHINIST."

A book just from the press of Henry Carey Baird & Co., 116 Nassau street, New York City, publisher of mechanical and industrial books, is the "Complete Practical Machinist," by Joshua Rose, M. E., author of other works of a similar nature. This is the 20th edition and has been enlarged by the addition of new and valuable material. It contains 547 pages and 432 illustrations.

HAYNES HOUSING PROJECT.

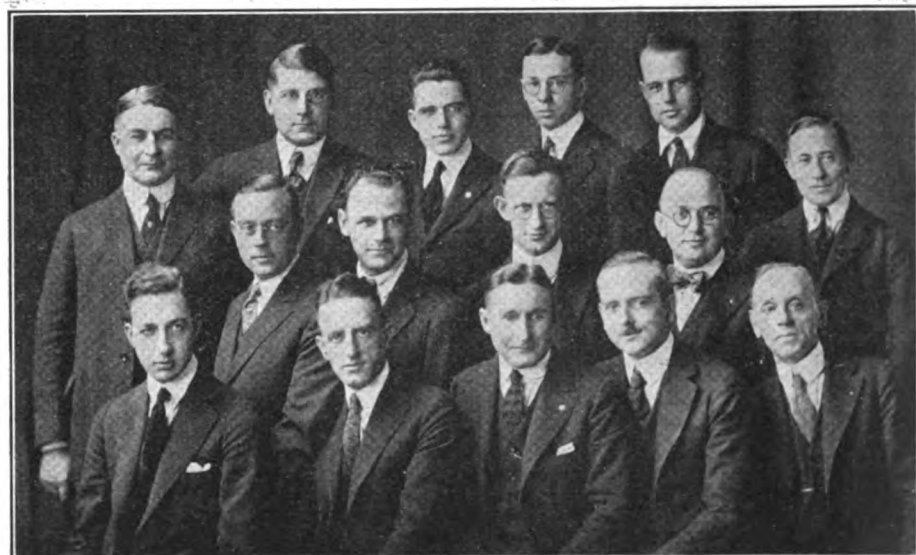
Realizing the benefits that would accrue to its employees from the adoption of some kind of a community housing plan, the Haynes Automobile Co., Kokomo, Ind., has instituted and begun active work on a comprehensive project which is designed to give effective relief to the housing difficulty so far as it affects the employees in the Haynes plant. It includes the immediate construction of 42 cottages on a choice and picturesque tract of land on the south side of the city and convenient to the factory. Actual work has been in progress for some time and most of the houses are now completed. The need for speed in the construction of these dwellings is imperative, as the new Haynes factory unit when completed will require the services of hundreds of additional men who will require suitable homes.

The man who conceived and brought to fruition this extensive piece of welfare work is A. G. Seiberling, vice president and general manager of the Haynes company.

BAILEY-DRAKE CO.'S SALES MANAGERS MEET.

The branch managers of the Bailey-Drake Co., Chicago, Ill., recently held a convention at the home office to plan the sales campaign for the present year.

At this convention it was announced that national sales work had been assumed for some dozen or more important automotive products, including the following: Jackson pneumatic and electric drills and pneumatic valve grinders, made by the Kalamazoo Railway & Supply Co., Kalamazoo, Mich.; Ibsco battery steamer, made by the Illinois Battery Steamer Co., Peoria, Ill.; the Klemme auto hoist and crane, made by the Klemme Manufacturing Co., Davenport, Ia.; the Mentor auto horse, made by the Safety Equipment Co., West Mentor, O., and the Nazett burning-in device, made by the Nazett Manufacturing Co., Eldora, Ia.



Group of Sales Managers of the Bailey-Drake Co., Chicago, Ill., Distributor of Automotive Products.



Jay V. Hall, Vice President in Charge of Car Production, Willys Corporation.

Jay V. Hall Joins Willys Corporation

The Willys Corporation, Toledo, has elected Jay V. Hall, former sales manager and a member of the executive committee of the Olds Motor Works to the office of vice president in charge of motor car production. Mr. Hall will have complete oversight of the manufacture of the new light six-cylinder car. He will be assisted by D. F. Edwards, who for two years was with General Motors Co.

DIAMOND T TO ENLARGE TRUCK

The Diamond T Motor Car Co. is enlarging its plant at 4517 West 26th street, Chicago, by the construction of a \$250,000 addition. This will increase the office space by 60,000 square feet to provide additional room for the sales promotion, purchasing and engineering departments. The equipment and body departments are enlarged by 54,000 square feet.

How Weather Bureau Aids Autoists

Weekly Bulletin Reports Condition of Roads in New England in Connection with Meteorological Forecast

PROBABLY no section of the country is more subject to sudden changes in weather and the consequent varying conditions in roads, than is New England, especially in cold weather, when snow and freezing conditions may be succeeded by rains or thaws sometimes within a space of 24 hours or even less.

A weekly topographical bulletin, accompanied by a chart, stating the exact condition of New England highways, is the last word in the endeavor of the United States weather bureau in aiding the motorist.

New England is the first section of the country to have the benefit of these bulletins. Ohio and New York are the only other states which are cooperating with the government weather bureaus, but neither of those states has gone so deeply into the project as has Massachusetts, through the established headquarters of the New England weather bureau at Boston.

These bulletins are spread broadcast throughout the New England states so that the autoist will know how the weather has affected the different roads over which he desires to travel. This service will save several hundred telephone calls which the weather bureau formerly received from autoists asking whether a storm is brewing over the White Mountains or Adirondacks or wherever else they were planning for a trip. Week-end and Sunday motorists are especially benefited by this service.

This coordination of the motorist and weather man is something new in the annals of motoring. Two hundred weather observers in New England are reporting weekly to the central bureau in the Postoffice building in Boston the condition of the roads near their observatories, and they are also issuing predictions of road conditions for the future.

The New York, New Haven & Hartford railroad agreed to telegraph notices to the central weather bureau upon climatic

conditions throughout southern New England and drivers of trucks making long distance hauls report the condition of the roads as they find them.

Making plans preparatory to starting the service on Nov. 10, J. W. Smith, meteorologist in charge of the Boston station of the weather bureau, issued the following card for distribution to points all over the New England section where cooperation might be expected:

"On or before Dec. 1, 1919, this office will issue on each Wednesday a bulletin giving details of the highways as affected by the weather. The bulletin will carry a small chart showing the distribution of snow on the roads; a forecast as to what affect the weather will have on the roads for the ensuing week, and a summary of road conditions covering construction, etc. At this time the work will be limited to the main traveled highways.

"This bulletin will be furnished free to those who cooperate in collecting the data, and to garages, hotels, public buildings, etc., where it is displayed for the benefit of the public. It can in no sense be furnished free for strictly personal use. However, it has been suggested to the central office of the weather bureau, Washington, D. C., that for a small subscription fee, sufficient to about cover the cost of material, the bulletin be furnished to any address.

"Please note the enclosed card—the card is addressed to you—and by scratching out your address and remailing, it will be returned to this office, and requires no postage. The data desired are self explanatory.

"If you find it convenient to mail each week this card properly completed please return the card. A supply of cards will be issued, so when additional reports in your neighborhood are needed you may submit them.

"On your address you will find a number which is for ready reference that we will ask you to use on all your correspondence with this office."

Cards are also to be supplied at various convenient points which can be filled in by any passing autoist who can report the exact condition of the roads he has just traveled, these to be mailed to the office of the weather bureau and if of sufficient importance will be incorporated with the weekly bulletin.

There is illustrated herewith, as a specimen of the bulletin sent out, a reproduction of the report for Dec. 17, and, as may be noted, there was at that time no snow over four inches except in the northern portions of Maine, New Hampshire and Vermont.

Report of Condition of Roads.

The detailed report of condition of roads, etc., which accompanied this bulletin, was as follows:

States and Main Highways.	Condition.
Maine.	
Portland (northeast F. to g. for the sea along the coast to son. Machias).	
Sebago	R. and frozen; icy.
Bangor, north and east.	R. and frozen; icy.
Greenville, north and south.	R. and frozen; icy.
New Hampshire.	
Concord, north, F. to Moultonboro; Franklin-Moultonboro-Bretton Woods - Lancaster-Colebrook.	F. to Moultonboro; p. Bretton Woods-Craw hotel.
Bridgewater - Rumney Depot - St. Johnsbury.	F. ruddy and frozen; icy.
Warner - Claremont - White River Junction - Montpelier - Burlington.	Trunk lines f, r in places and slow.
Vermont.	
(See Pittsfield and Concord.)	
Burlington - St. Albans - Enosburg Falls-Richford.	R. and frozen; icy.
Massachusetts.	
Boston - Lawrence - Manchester.	G., except r 1 mile above Fellsway.
Newburyport along coast to Portland.	Good
Plymouth-Sagamore Buzzards Bay-Provincetown.	Good
Taunton-Fall River-New Bedford.	Construction Middleboro, Randolph d Grove St. Post-office, otherwise g.
New York via Providence-New London-New Haven and shore line.	G., except construction 5 miles West-erly, R. I., d shore road, p Plainfield Pike w Thornton, R. I.
Worcester - Springfield - Jacobs Ladder-Pittsfield.	R at Palmer and Springfield to foot ladder; construction at Chester; elsewhere g.
Ayer - Fitchburg - Mohawk Trail-North Adams.	G. to ex., except Florida Mt., and Charlemon p.
Wilmington - Lowell-Nashua - Manchester.	Construction at Wilmington, d at Bilerica.
Worcester-Fitchburg.	Good.
Wrentham - Franklin-Taunton.	Good.

Blank to Be Made Out at Various Points to Aid Observer at Central Office in Reporting Road Conditions.

Please answer—Scratch out your address—and remail.

No. Place and date

(Use same number as on address)

Condition of roads from

.....

Bad places, where?

How bad?

Heavy snow or rain

Depth of snow

Any further remarks

Signature

States and Main Highways.	Condition.
Uxbridge-Providence.	Northbridge construction here to Whitinsville, elsewhere g.
Barre-Athol	P 2½ miles w of Colebrook; g beyond.
Pittsfield - Lanes - boro - Williams - town - Bennington.	Frozen and quite rough; icy.
Vt. - Manchester - Brandon - Burlington.	
North Adams via Berkshires.	Good.
N. Lebanon-Queechey Lake-Albany.	Main road closed, construction over Lebanon Mt., d from Shaker Village via Queechey Lake to New Lebanon, N. Y., almost imp.; about only good road is via Gt. Barrington-Hudson, N. Y., thence to Albany.
Rhode Island.	
(See New York, Hartford and Worcester.)	
Providence-Newport.	Good.
Connecticut.	
Hartford - Greenfield - Springfield.	Good.
Willimantic - Putnam-Providence.	Good.
Norwich	G, except r South Windham-Yantic.
Middletown - Saybrook.	Good.
Meriden-New Haven.	Good.
Plainville - Plymouth-Danbury.	R at Woodbury; elsewhere g.
Canaan-Great Barrington - Lenox - Pittsfield.	R in places, Lenox - Stockbridge; otherwise f.
New London-Putnam-Worcester.	P at Webster; elsewhere f.

Symbols—Points of the compass n., ne., etc.; ex., excellent; g., good; f., fair; p., poor or passable; imp., impassable; d., detour; r., rough.

SECOND AERONAUTICAL EXPOSITION.

The Manufacturers' Aircraft association will hold its second annual aeronautical exposition at the 71st Regiment Armory, 34th street and Park avenue, New York City, March 6-13. This exhibition will embody a record of what American designers have accomplished in the design and development of commercial airplanes—for private use, for sporting or touring purposes, or long distance transportation of freight, passengers and mail. The displays will represent all the producing airplane factories in the United States. Many of the types are already assembled and in daily service. Some of the larger ones are carrying mail between the principal cities. Others of advanced construction will receive trial flights a few weeks before the show.

Many of the models will be fitted with comfortable enclosed cabins with unbreakable glass windows, seating from four to 12 passengers in chairs as luxuriously appointed as those of a Pullman railway coach. The noise of the motors is deadened and a flight may be enjoyed with the same comfort and convenience as though riding in an observation car or limousine. Many of the smaller cars are of the limousine type, accommodating two or three persons, and comparatively

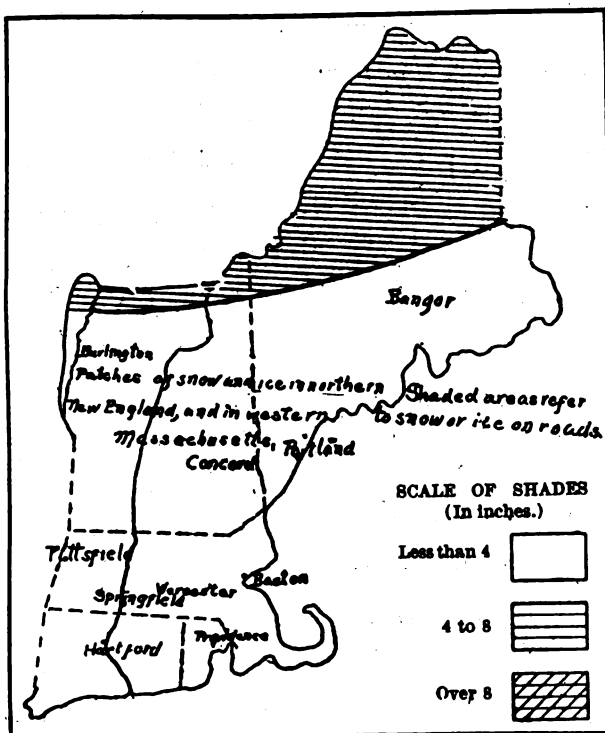
NEW ENGLAND HIGHWAY WEATHER BULLETIN.

Boston, Mass., Dec. 17, 1919.—Road Forecast for Northern New England: Earth roads will be slow, rough and frozen, improved roads generally good, except some ice. No melting until early next week and then in midday hours only.

Road Forecast for Southern New England: Earth roads will be poor and bumpy, frozen, with some ice in interior; improved roads generally good. Melting in midday hours Sunday and thereafter.

Subscription at 50 cents per year. Mail money order or New York draft to Superintendent of Documents, Government Printing Office, Washington, D. C. Send copy only of your letter to this office.

Weather Bureau Chart Indicating Amount of Snow and Condition of Roads in New England.



inexpensive as to initial cost and expense of operation. A majority of the sporting types will be flying boats.

The larger planes will have a carrying capacity of from 3000 to 6000 pounds and driven by three or four motors, will cover half the distance across the United States in a single flight. The cost of operating airplanes has been reduced the past year from the almost prohibitive figures of \$1 to \$2 a mile, until it now compares favorably with motor truck and railroad transportation rates.

BATTERIES TO BE MADE AT FORT WAYNE.

The Fort Wayne Battery Manufacturing Co., Fort Wayne, Ind., is to make storage batteries for automobiles and lighting systems in a plant recently acquired on North Clinton street in that city. The two-story building which forms the initial unit is 54 by 196 feet and is constructed of concrete and brick with ample daylight lighting facilities afforded by large windows and a glass roof. A boiler house 50 by 57 feet is also being constructed. The company has secured an option on several vacant lots adjoining the present plant.

Among those interested in the Fort Wayne Battery Co. are S. A. Lehman, J. C. Sherer and George Houser, all of Fort Wayne.

DESIGNING ENCLOSED TOPS.

The Sargent & Ham Co., Boston, has designed a type of demountable or permanent enclosed tops, said to be so skillfully constructed and installed as to render them difficult to be distinguished from standard closed bodies, and under its patents the company is allotting manufacturing rights to body builders.

FAIRBANKS TO DISTRIBUTE LINCOLN ELECTRICS.

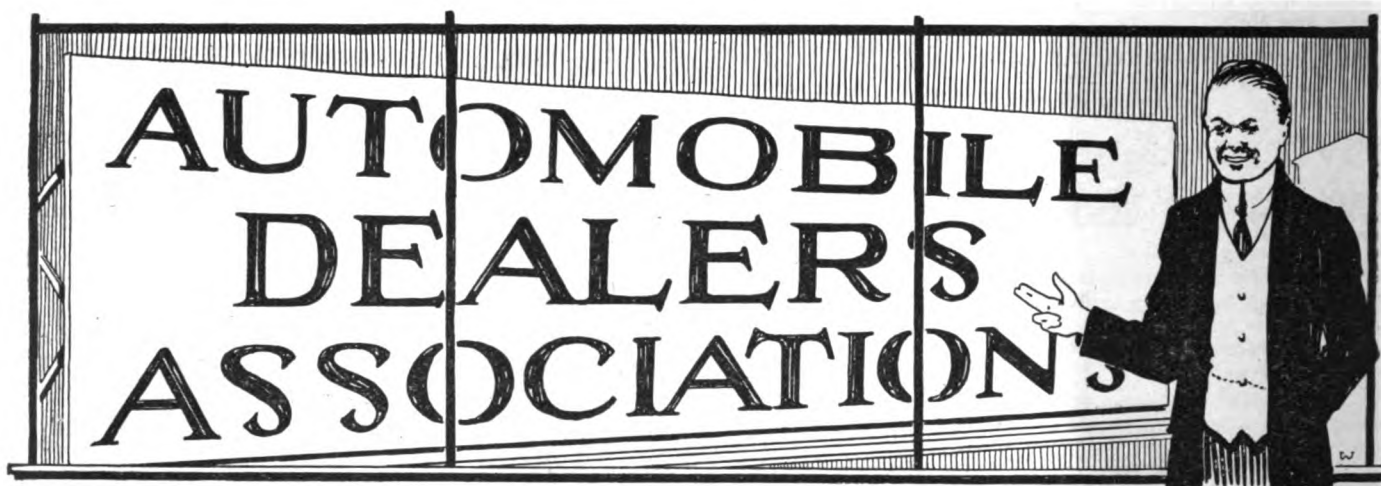
A contract recently signed between the Fairbanks Co. of New York City and the Lincoln Electric Co., Cleveland, O., gives the former company the exclusive distribution of Lincoln electric motors for industrial applications. This line includes alternating current motors for two and three-phase circuits in capacities from one-half to 150 horsepower.

The Fairbanks Co. will cooperate with the various Lincoln district offices in connection with the sale of other Lincoln products. The Lincoln Electric Co. is the third largest manufacturer of industrial electric motors in the country, and the Fairbanks Co. deems it an honor to place its well known "O K" on this motor.

TO MAKE THE "SOUTHERN SIX."

The Southern Automobile Manufacturing Co., which has been organized at Nashville, Tenn., with a capital of \$1,000,000, announces that it will erect a \$300,000 plant in Memphis, Tenn., to build passenger cars and trucks of a new design. The passenger car will be known as the "Southern Six" and will be made in roadster, five and seven-passenger models. The company will also add later a line of tractors suited to southern requirements.

Among those interested in this concern are W. A. Shipley and W. B. Frazee, both of Little Rock, Ark., and Lovick P. Miles and S. P. Walker of Memphis, while the active head of the company is W. A. King, an automobile manufacturer of wide experience, who began his automotive business career in the early days of the industry in Toledo, O.



Portland Repair Men's Association

Launched upon its sixth year of active existence, the Portland Garage and Repair Men's association boasts of a membership of more than 200 garages, repair shops and accessory concerns, while its efforts are paving the way for regional organizations in Oregon, with a state association in the offing.

In December, 1914, a group of 15 optimists banded together in an effort to eliminate many bad practices which had crept into the activity of the crafts and to supplant the feeling of suspicion and enmity with one of respect, if not friendship. All of these things have been remedied. Practically all members of the automotive crafts are welded together in an enthusiastic organization, while craftsmen and public are protected from unfairness in price and quality of workmanship.

The association publishes a trade journal, "Automotive News," which is not only mailed to all members, but is sent into every garage, repair and accessory shop in the State of Oregon. It has grown into a 32-page magazine, dealing with the problems of the trade.

The publication of this magazine has been taken over by James S. Cassell, 817 Dekum building, Portland.

ILLINOIS ASSOCIATIONS JOIN N. A. D. A.

During the last three months, 13 new automobile trade associations have joined the National Automobile Dealers' association, as follows:

Springfield Automobile Dealers' association, Jacksonville Automotive Dealers' association, Decatur Automobile Trades' association, Logan County Auto Dealers' association, Lincoln; Automotive Association of Mattoon, Galesburg Automotive Dealers' association, Quincy Automobile Trades' association, Auto Trades' association of Champaign county, Alton Automobile Dealers' and Accessory association, Hannibal Automobile Dealers' association, Fort Wayne Auto Trades' association and the Terra Haute Automobile Dealers' association.

FORT WAYNE DEALERS' OFFICERS.

Following are the officers of the Fort Wayne Automobile Dealers' Trade association, recently elected: President, Matt Jones; vice president, Ward Becker; secretary, C. Schiefer; treasurer, Fred Pennell. The association presented the retiring president, A. L. Randall, with a gold watch and chain. Mr. Randall has presided over the association since its organization, five years ago.

N. A. D. A. State Vice Presidents

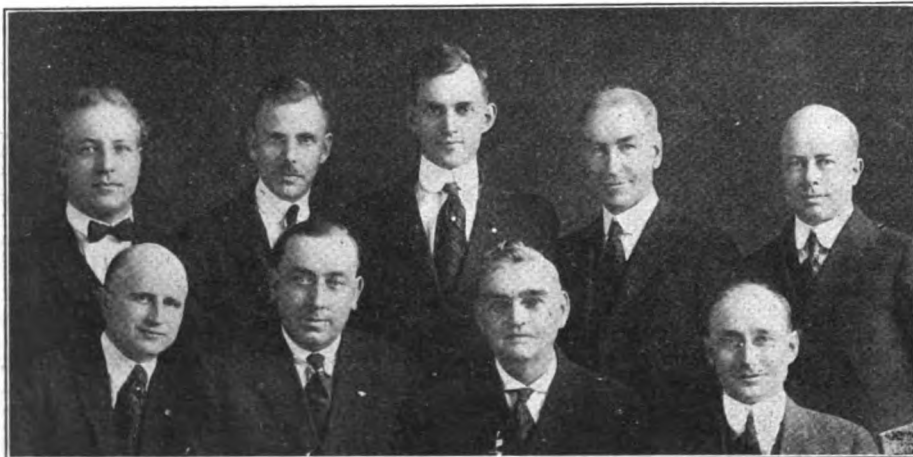
A real representation of the automobile dealers of the United States, an object for which the National Automobile Dealers' association has been striving for some time, has been assured by the creation of an advisory board composed of one dealer in every state, which is known officially as the board of vice presidents. It has been the aim to choose men highly representative of the industry.

Those whose selection has been officially announced by the directors of the N. A. D. A. follow:

Alabama, L. J. Adams, Mobile; Arizona, George H. Reuben, Phoenix; Arkansas, C. G. Faulhaber, Little Rock; California, Royal Miller, Sacramento; Colorado, Tom Botterill, Denver; District of Columbia, R. J. Murphy, Washington; Florida, Claude Nolan, Jacksonville; Georgia, R. A. McCord, Macon; Idaho, Warren Paul, Pocatello; Illinois, H. B. Pinkerton, Peoria; Indiana, N. H. Carlinhour, Indianapolis; Iowa, J. R. Rude, Marshalltown; Kansas, W. H. Imes, Topeka; Louisiana, George D. Wray, Shreveport; Massachusetts, A. J. Shorey, Boston; Minnesota, H. B. Knudsen, Duluth; Mississippi, T. J. Hines, Jackson; Missouri, M. L. Cowden, Springfield; Montana, A. T. Heaney, Great Falls; Nebraska, Guy L. Smith, Omaha; Nevada, E. D. Mack, Reno; New Mexico, A. R. Davis, Raton; New York, E. J. Ellis, Rochester; North Carolina, Lindsay Fishel, Winston-Salem; Oklahoma, M. H. Randall, Oklahoma City; Oregon, M. O. Wilkins, Portland; Pennsylvania, George MacFarland, Harrisburg; Rhode Island, C. H. Everett, Providence; Utah, A. G. Randall, Salt Lake City; Washington, P. E. Sands, Seattle; Wisconsin, Jesse Smith, Milwaukee.

States in which vice presidents remain to be chosen are Connecticut, Delaware, Kentucky, Maine, Maryland, Michigan, New Hampshire, North Dakota, Ohio, South Carolina, South Dakota, Tennessee, Texas, Vermont, Virginia and West Virginia.

The expenses of the vice presidents to and from the Chicago meetings and to and from all other meetings to which they go on call of the directors will be borne by the national association.



Official Family, Portland Garage and Repair Men's Association, for 1920—Top Row, Left to Right: Fred Dundee, Director; V. C. Uaden, Director; Will J. Lester, President; A. N. Stanton, Director; H. M. Nisbet, Secretary. Bottom Row, Left to Right: James H. Cassell, Editor; Virgil Cooper, Vice President; A. E. Foss, Director; G. G. Gerber, Treasurer.



John J. Behle, Manager, Cincinnati Trades' Association.

OFFICERS OF CINCINNATI TRADES' ASSOCIATION.

The Cincinnati Automotive Trades' association has elected the following officers for the ensuing year:

Manager, John J. Behle, 409 First National Bank building; president, A. C. Mundew, Gloucester Supply Co.; vice president, E. H. Silva, the Silva Co.; treasurer, R. R. Woolley, Buckeye Tire & Repair Co.; secretary, Ralph R. Curl, H. W. Johns-Manville Co.; board of directors, the four elected officers and E. J. Leesmann, Firestone Tire & Rubber Co.; Charles A. Fisher, the Charles A. Fisher Co.; Albert Schneider, Auto Tire & Repair Co.; finance committee, J. W. Brumbaugh, the I. J. Cooper Rubber Co.; W. W. Robertson, Miami Vulcanizing & Rubber Co.; D. E. Holbes, Stewart Product Service Station.

BROOKLYN DEALERS TO EXPAND.

When the Brooklyn, N. Y., Motor Vehicle Dealers' association was originally organized only 30 shares of stock were provided, and this was more than enough to give every member of the trade in that city at that time a share. Since then the motor car industry has so expanded that the membership of the association includes many who could not be given any of the original stock, and it is now planned to issue enough new stock so that every reputable dealer that becomes a member may hold a share. In addition an associate membership is planned that will include all Long Island dealers.

The stockholders have also agreed that all money made at the forthcoming motor car show, Feb. 14-21, and other funds collected through membership fees, etc., shall be spent in building up a powerful organization. A permanent office, with a paid secretary, is to be established.

The Automobile Trade association of Fort Wayne, Ind., has decided to affiliate with the National organization.

Philadelphia Truck Annual Meeting

At the recent annual meeting of the Motor Truck Association of Philadelphia, the following officers were elected:

President, E. J. Berlet, Stability Motors Co.; vice president, J. P. Cranston, Vim Motor Truck Co.; treasurer, W. R. Walton, Firestone Tire & Rubber Co.; secretary, W. H. Metcalf, Wire Wheel Corporation of America; directors for two years, Thomas H. Quirk, H. Kaiser & Co., F. A. Kissel, Kelly-Springfield Tire Co.; F. P. Gaul, Gaul, Derr & Shearer Co.; director for one year to fill unexpired term of Lee J. Eastman, Walter Y. Anthony, Packard Motor Car Co.

Mr. Anthony presented a report on the proposed department in one of the city high schools for the training of automotive mechanics, in which he stated that Professor Ash of the city school system was about ready to inaugurate the new course, with the approval of the board of education, in either the Frankford or Central high schools, and that a dozen firms had pledged themselves to supply automobile parts for use in this department.

FLORIDA DEALERS HAVE ORGANIZED.

More than 200 automotive dealers of Florida recently convened at Orlando and organized the Florida Automotive Dealers' association with the following officers:

President, Claude Nolan, Jacksonville; vice president, Joe Thorpe, Miami; treasurer, D. F. Owen, Tampa; directors, Ray B. Crall, Tampa, First Congressional District; J. R. Fowler, Gainesville, Second Congressional District; J. D. S. Houston, Tallahassee, Third Congressional District; I. W. Phillips, Orlando, Fourth Congressional District; E. C. Kirby, Jacksonville, director at large.

This association has decided to affiliate with the National Automobile Dealers' association.

BISHOP ELECTED PRESIDENT.

The Brooklyn, N. Y., Motor Vehicle Dealers' association has elected the following officers:

President, Clifford M. Bishop; first vice president, Chester W. Maxson; second vice president, Fred Kengster; secretary, Warren A. Sellon; treasurer, I. C. Kirkham.

The following were admitted to membership: Reo Motor Car Co., Parkinson Motor Car Co., the Couch-Hass Co. and the Franklin Motor Car Co.

BRIDGETON'S DEALERS' FAIR.

The Bridgeton, N. J., Automobile Dealers' association has fixed Feb. 7-14 as the date of its fifth annual show. This show has grown to be considered one of the most important in the East outside the big cities, and many special features are being planned for this year.

DEALERS' RESOLUTIONS.

That perhaps the owner is right some of the time.

That all men are not looking for something for nothing.

The investment made by the owner means as much to him as it does to me, oftentimes more.

That a satisfied customer is valuable to me.

To give only a fair market price for a trade.

That every man entering sales-room or service station shall leave satisfied—unless they may be of the four-footed variety.

To take owners into our confidence.

OHIO ASSOCIATION'S OFFICERS.

The Ohio Automobile Trade association has elected the following officers for the ensuing year:

President, A. E. Mitzel; first vice president, I. Van Baalen; second vice president, W. E. Griffith; trustees, B. J. Borchers, T. R. Dahl, Y. B. Jones.

LEBANON'S FIRST SHOW.

Lebanon, Pa., will have its first automobile show March 10-13, under the auspices of the newly organized Automobile Trade Association of Lebanon. Dealers in the city and county of Lebanon are eligible for membership.

PROCTOR BECOMES SECRETARY.

Carlton C. Proctor, deputy commissioner of the bureau of industrial aid, Buffalo, N. Y., has resigned to accept the appointment as executive secretary of the Automobile Dealers' association of that city.



F. H. Greer, Director, Los Angeles Dealers' Association.

Protecting Car When Not In Use

IF THE motorist intends to put his car up for the winter months, the following procedure may prove of value to him, as it is complete, authentic and to the point:

The prime object to bear in mind is protection against cold and dampness, two factors which can do more injury to the car than 20,000 miles of driving.

Thoroughly Inspect Garage.

The first and obvious thing to do is to thoroughly inspect the garage to be sure that it is weather proof. If it could be hermetically sealed it would be ideal, but as this is impracticable, the next best thing is to see that all cracks and openings are closed up, that the doors fit properly and that everything is in such condition that the car will be as well protected as possible.

Wash and thoroughly clean the car and jack it up by placing four wooden trestles under the frame, the best points of support being close up against the two front shackle bolt brackets of the front springs. Supporting the chassis in this manner takes all weight off the springs and wheels.

Care of Tires.

Remove all tires from the rims and completely exhaust the air from the inner tubes; rub them down well with soap-stone, sprinkle with French chalk, fold them up perfectly flat, care being taken not to crease them, and place in inner tube bags. The tires should be laid down flat. Store both tires and tubes in a dark place.

Clean and shellac all rims.

Drain and Clean.

Drain off water from the radiator and cylinder block. Flush out the radiator with the hose. To insure that all water has been emptied from cylinder block and water pipes, start up the engine and run slowly for a few moments. This will convert any water which might have collected in the water jackets into steam. Replace any plugs removed to drain off the water and close drain cocks.

Empty gas tank and drain carburetor.

Disconnect electrical cables at battery and remove the battery. Smear ends of cable with vaseline. Fill batteries with distilled water and store in a dry place where there is no danger of freezing. (Batteries should be taken to a charging station and recharged every two months in order to best preserve them.)

Other Important Points.

Release clutch by propping open with strip of wood placed between clutch pedal and floor board.

Wipe all machined parts of engine, transmission, clutch and steering gear with an oil-soaked rag.

Cover engine completely with canvas, burlap or an old rug and replace bonnet.

Oil all steering joints and connections and wrap with a cloth.

Fill shackle bolt oil cups with oil and wrap with a cloth.

Fill and screw down all grease cups.

Prv open spring leaves and inject graphite and bandage with a cloth or canvas.

Put the top up and cover the whole car with a dust sheet which will envelop the machine on all sides, and attach tape or cords to the ends and tie together underneath the car.

Reminders for Spring.

Also write the following reminders on a tag and tie to the steering wheel so that they will be sure to be attended to when the car is used again in the spring:

Fill radiator with water.

See that drain cocks are closed.

Empty oil pump and refill with fresh oil.

Thoroughly oil and grease as per oil lubrication chart accompanying car.

Refill battery with distilled water and recharge to its capacity.

Flush out carburetor with gas.

If the above instructions are carefully carried out there will be reasonable assurance that the car will look and drive as well as when it was put away.

MILBURN CO. PROVES A PHOENIX.

The Milburn Wagon Co., one of the largest manufacturers of electrical vehicles in the world, was recently visited by a \$1,000,000 fire at its big Toledo, O., plant, and although of course handicapped in its production programme, promises deliveries to distributors and dealers through January and February, and by May 1 the rebuilt plant will put it on a 100 per cent. production basis again. The company was fortunate in saving practically all its uncompleted cars, while the body department miraculously escaped intact. The trimming and painting departments were destroyed, but arrangements were at once made to accommodate these in other buildings. The completed and partially completed cars were moved to plant No. 2, whence they will be completed and shipped. The main offices of the company have been removed to a building in the heart of the business district, formerly occupied as central Red Cross quarters. It is stated that when the reconstruction plans are completed the Milburn plant will have twice its former capacity.

ONE TAG GOOD EVERYWHERE.

One automobile license tag, that of the owner's home state, will be good anywhere in the United States, if a bill recently introduced in Congress by Representative Sweet of Iowa is passed. It is felt that reciprocity between the states in the matter of automobile licenses has been left to the various states themselves too long and has been neglected or ignored to the inconvenience of the motorist, and government supervision along this line would seem to be welcomed.

By a provision of the same bill it will also be possible for tourists to motor anywhere in foreign countries by simply substituting a tag marked "U. S." and a number for the home state license tag.

THE MOST ACCURATE MAN.

For years the Nordyke & Marmon Co., Indianapolis, Ind., has used as a standard by which to set and test its inspection gauges, the famous Johannsen blocks, which are the last word as standards of measurement for engineers and scientists when dealing in the thousandth of an inch or less.

These are small blocks of metal, which come in sets enclosed in small velvet-lined boxes and are more accurate than anything else in the world. They are prepared by C. E. Johannsen of Christiana, Sweden, who has measured a millionth of an inch. His first set of blocks was submitted to the learned scientists of the International Bureau of Standards, Paris, and they were tested and measured mathematically for two years by Professor Benoit, head of the institute, at the end of which time they were pronounced absolutely accurate and Johannsen has since been known as "the most accurate man in the world."

Mr. Johannsen recently visited the Nordyke & Marmon plant at Indianapolis and after a tour of inspection guided by Max Thoms, supervisor of inspection, expressed himself as amazed that such accuracy and interchangeability of parts should be possible in the making of a motor car.

FIFTY-HOUR TRIAL.

In the recent 50-hour time and endurance trial on the Cincinnati, O., speedway, Dave Lewis, Tommy Milton and De Loyd Thompson made an average speed of 60.7 miles an hour for a total of 3037 miles in a 183-cubic inch stock model Essex. The Essex company has applied to the A. A. A. for official records for one, four, 12, 24, 36, 48 and 50 hours, the mileage for these periods being as follows, respectively: 69, 255, 819, 1539, 2329.5, 2912, 3037. The drivers worked in six-hour shifts.

The car was equipped with Goodyear cord tires and rims on Houck wire wheels, the tires being 32 by 4 straight side, the set being taken from stock in the Cincinnati branch. The front pneumatics not only ran 3037 miles in the final trial, but were used in two previous trials, a total of 5870 miles. At the finish the front tires were in perfect condition, while the rear set showed slight wear on the tread.

FISHER BODY CO.'S PURCHASE.

The Fisher Body Corporation, Detroit, Mich., has purchased the Saginaw Plate Glass Co., Saginaw, Mich., which will be combined with the Columbia Plate Glass Co., Blairsville, Pa., and the Federal Plate Glass Co., Ottawa, Ill., under the name of National Plate Glass Co. This purchase is in line with the policy of the Fisher Body Corporation to acquire plate glass factories to supply its own glass for use in automobile body building.

The number of motor cars in the Mexican Republic is 18,000.

WORLD'S OLDEST VEHICLE CONCERN HANDLES COLUMBIA.

In connection with the announcement, by E. Leidich, foreign sales manager of the Columbia Motors Co., Detroit, maker of the Columbia Six, that the Columbia line has just been taken on by Ram Naick & Co., Madras, India, it is interesting to note that this Indian distributor is the oldest existing vehicle concern in the world, as its history, related by V. R. Rao, its American representative, will bear out.

The Naick company dates its beginning in antiquity to the days of palanquins and chariots, when it was first organized and began building palanquins, those wheelless vehicles in which passengers were carried on the shoulders of four stalwart bearers. Somewhat later the construction of chariots was begun, but before their advent, while horses were numerous in India, they were used solely for horseback riding and war purposes. The next step in progress was the making of two-wheeled bullock carts, and this seemed to be the limit for a long time. But Mr. Rao explains that there is a good reason why the manufacture and use of vehicles did not progress in India at that time, as there was no such thing as a road there. Even the streets in the larger villages were nothing but muddy trails which only a two-wheeled chariot or bullock cart could traverse.

At a considerably later date, following the construction of fairly passable roads, the Naick company extended its line to include four-wheeled vehicles, such as carriages, coaches and wagons. And finally it has now reached the ultimate stage of its progress by becoming the largest distributor of passenger automobiles and trucks in India. While the concern has never attempted to build passenger motor cars or even passenger car bodies, as it was realized that American manufacturers can do that so much better and more economically than the Naick company, even with its centuries of experience, it is constructing a considerable number of truck bodies suited to the peculiar requirements of the country, and is mounting them on American truck chassis.

Mr. Rao states that the climatic conditions in India are very variable, ranging from an average of over 100 degrees throughout most of the year in the coast cities, to temperate and even cool weather in the mountainous regions, and one reason why the Columbia Six seems so ideally adapted to the country is on account of its feature of the automatic thermostatically controlled radiator shutters, which are designed to keep the motor at a constant temperature.

NEW PRICES FOR NATIONAL.

The following new schedule of prices for National cars has been put into effect by the National Motor Car & Vehicle Corporation, Indianapolis:

Touring car, \$3500; phaeton, \$3500; roadster, \$3500; coupe, \$4650; sedan, \$4700; chassis, \$2950.

Operation of Car in Cold Weather

THE following suggestions are intended to assist the motorist in keeping his car in such condition as to insure its economical and efficient operation in cold weather. If followed they should insure against unnecessary trouble and inconvenience, and the car can be operated without the unusual wear and strain to which it is sometimes subjected under cold weather conditions.

Cooling System.

To prevent the cooling system freezing add wood or denatured alcohol to water to suit the local conditions. Some people prefer to use glycerine in conjunction with alcohol, because it prevents evaporation to a certain extent.

Engine.

The engine should be drained of all old oil, the crankcase washed out with kerosene and filled with fresh oil, a lighter grade than that used for summer driving. The oil in the engine should be examined every week and replenished as often as necessary, depending upon the use of the car. The valves must be in good condition, seating closely and be well adjusted. The carburetor must be adjusted to insure easy starting.

Gearset.

Remove all old grease from the gearset and wash out thoroughly with kerosene or gasoline. Fill the gearset to the level of the countershaft with transmission compound.

Rear Axle.

Clean all old grease from the differential housing and wash it thoroughly with kerosene or gasoline. Fill with a rear axle compound, which is similar to transmission compound. Do not use grease in the gearset or rear axle, but use the special transmission and rear axle compound, which can be furnished by your local dealer or oil man.

Storage Battery.

Examine the storage battery carefully to see that none of the cells leak, and that the container is in good condition. Test your battery with a hydrometer once a week to make sure that it is fully charged. If it is not fully charged and you are not driving so as to keep it charged, have it recharged from an outside source. A fully charged battery will not freeze at any temperature it may be exposed to, but the capacity of the battery may be quickly reduced because of the heavy drain upon it.

To make the battery's job easier use the right grade of oil. Employ air choke to introduce a rich mixture into the cylinders when starting.

Clean the battery terminals and connections and make sure that they are tight, being especially sure that the ground connections from the battery are bright and solid.

General.

Thoroughly clean and lubricate all moving parts, such as spring bolts, wheel bearings, steering connections and the steering gear itself, taking up any lost motion.

Starting.

To get satisfactory results from your car it is necessary that the engine start with reasonable ease and run well. After you have made sure that the above conditions have been taken care of start the engine in the following manner:

In moderately cold weather pull the carburetor dash adjustment out as far as possible; close the throttle and set the spark lever not over one-third of the way up the quadrant, provided that the levers work from the bottom of the quadrant to the top. If from the top down apply the rule in reverse. Then step on the starter button and after the engine has turned over three or four times turn the ignition switch. As soon as the engine gets to running push down on the carburetor adjustment enough to close the priming by-pass valve, and then as the engine warms continue to press the dash adjustment. Do this just a little faster than the engine warms. For starting in extremely cold weather the primer should also be used. Before stepping on the starter button, unscrew the priming pump handle, where a primer pump is provided, and give two or three full strokes, being sure that the handle is then screwed tightly shut. Then start the engine as described.

PRICE OF MAIBOHM SEDAN INCREASED.

Owing to the steadily rising costs of both labor and materials, the Maibohm Motors Co., Sandusky, O., has raised the price of its sedan model to \$2100 f. o. b. Sandusky. This has a capacity of five passengers and the coach work is done entirely at the company's new body plant.

Coincident with this increase in price comes the announcement that each sedan in the future will be equipped with 32 by 4-inch wheels and tires without extra charge. In the spring the tire equipment of the phaeton model will be changed from 32 by 3½ to 34 by 4 inches. Wire wheel equipment in the 32 by 4-inch size can now be supplied on all cars, the extra charge for a set of five wire wheels with the square wheel carrier being \$90. Four inch tires on the phaeton, used with wire wheels, will cost \$28.46 extra, in addition to the price of the wire wheels.

CHANGE IN MUELLER CO.

The partnership of R. S. Mueller & Co., manufacturer of electric test and battery charging clips, was dissolved on Dec. 1, Ralph S. Mueller having purchased the interest of George B. Dusingberre. Mr. Mueller will consolidate the clip business with that of the Mueller Electric Co., 423-425 High avenue, Cleveland, O., and under that trade style will continue the manufacture of clips, attachment plugs, battery handles and other electrical specialties.

The Hupp Motor Car Corporation, Detroit, Mich., paid on Feb. 1 an initial quarterly dividend of 2½% on common stock.

LIBERTY SPARK PLUGS.

Extremely broad claims are made for the efficiency and endurance of Liberty spark plugs, made by the Federal Corp., 100 North Elm street, Westfield, Mass., a concern that specializes this product in a large plant with every facility for high grade production. The plugs are made to exclusive design and this and the use of materials are covered by application for patents now pending.

The insulators are Steatite, a material that cannot be broken by extremes of heat or cold, is proof against electrostatic puncture, and will endure against shocks that would shatter porcelain. The heavy shell is brass and the dome shaped insulator is capped with a brass connection. The shapes of the center and shell electrodes are such that oil cannot accumulate upon them in sufficient volume to soot or carbonize, and claim is made that they are in effect self-cleaning. These plugs are made in all standard sizes and they are sold for \$1.50 each.



NEW STERLING TREAD.

The Sterling Tire Corporation, Rutherford, N. J., announces that the new Sterling vacuum tread is being adopted for its large size tires as rapidly as the equipment can be placed in commission. It has been tested out under the same conditions as the bar type and is reported to give even greater mileage.

It is stated that as a rule nearly all types of tires are run with insufficient air pressure and when semi-flat the bars, and for that matter any marked raised figures, work on the fabric layers beneath with an uneven kneading action, tending, after long mileage, to separate the layers. It is claimed that the new vacuum tread affords an equal bearing surface over its entire circumference, and that it is also free from the kneading caused by raised figures, which tends to "ball" the friction and make blisters.

STRAIGHTENING BENT FRAMES.

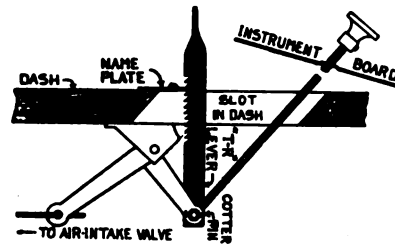
Although a bent channel steel automobile frame can often be straightened when cold, it is considered the better practise to first heat the metal. A blow torch will generally serve for this purpose. A length of wood should then be placed at one end of the frame and a closed jack at the other end, the head of the jack just touching the end of the bent section. As the metal becomes hot the jack can be let out a little at a time until the frame is fully straightened. This method is better than hammering, as the action is gradual and the danger of cracking the metal is greatly reduced.

"T-R" STARTING AID FOR FORD CARS.

The Tolman-Reeve Engineering Corporation, Chicago, Ill., has just brought out a new and interesting little device, known as the "T-R" Starting Aid for Ford cars, which is something of an innovation in the field of Ford accessories.

It is made in two models, the No. 1 being adapted for the older Ford cars without self-starting equipment, while the No. 2 is for cars equipped with self-starters. Model No. 2 is represented in black in the sketches. It consists of a toothed lever and a name plate. As the choke rod in the Ford self-starting device is raised the notches in the lever engage the name plate and hold the choke rigidly at any desired point. When the lever is tripped by a touch of the foot the choke snaps back to normal through the action of the spring in the carburetor.

Model No. 1 for hand-cranked Fords fills even a greater need than the No. 2, for it supplies the equivalent of the Ford dash choke arrangement found only on the self-starting cars plus the "T-R" Starting Aid feature of fixed choke control. Dash choke control is thus obtained absolutely independent of the wire choke device at the radiator.

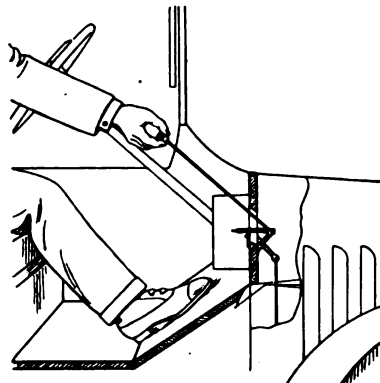


Model No. 2 "T-R" Starting Aid for Ford Cars.

Most drivers, in order to obtain easy starting use a carburetor mixture richer than necessary when the engine is warm. This is unnecessary with the "T-R" Starting Aid, for the carburetor can be set at a thin mixture and a partial choke used for driving the engine while cold.

The device is unique in its ease of installation, its simplicity, the manner in which it fits in with the Ford choke equipment of the self-starting cars and the precision with which it functions. Installation is effected in less than five minutes by inserting the lever in the slot already existing in the Ford dash, cottering as shown and screwing on the name plate.

The model No. 1 retails for \$1 and the model No. 2 for 75 cents.



Showing Application of "T-R" Starting Aid on Ford Car.

Care of Tools and Parts of Car

Many car drivers are careless and this adds considerably to their annual motor-ing charges. Formerly when a spare casing and two or three extra tubes were carried for emergency use, when there was a case of tire repair on the road the motorist usually was in a desperate hurry to get going again and seldom took the pains to carefully put away the punctured tube or the injured casing, and the former was thrown under the rear seat with a lot of miscellaneous articles and tools and the casing was hurriedly strapped to the tire carrier.

With the tube jolting around with every movement of the car, it is easy to realize that an article that costs from \$6 to \$8 could be easily chafed in several places and thus practically ruined. Tubes, above all things, should receive care and should be carefully folded, tied up, placed in a waterproof casing or canvas bag, and then stowed away so as to suffer no injury. This also applies to any other part that is carried, for in addition to the fact that an article can be easily injured, it may also be mislaid and not available in an emergency unless the old rule "a place for everything and everything in its place" is adhered to.

The motorist should make an inventory of his tool kit and should eliminate those articles he finds he does not need and add a number that experience has taught him are essential. Then he should locate a small tool bag so that it would be accessible at all times, and care should be taken to keep each tool in its place therein.

It is somewhat of an anomaly that while year after year the designers have catered to the comfort of the passengers, yet they have overlooked the important matter of the storage of spare parts, tools and the like where they would be conveniently at hand when required in a hurry while on the road.

The motorist is, therefore, left to his own resources in these matters.

STOPPING SKIDS.

When the rear of the car starts to slip sideways do not apply the brakes, but push out the clutch and steer "into the skid." In other words, turn the front wheels slightly towards the point the rear wheels are sliding. Sometimes it is advisable to leave the clutch engaged and apply more power, steering into the skid as before until the car straightens out.

TO CLEAN VALVE STEMS.

A very simple way of cleaning valve stems which may have carbon deposits is to inject a little kerosene in the air valve of the carburetor while the engine is running. A little of the kerosene will find its way down the valve stem, softening and washing off the carbon. A wise policy is to do this at monthly periods.

CALENDAR OF COMING EVENTS

- Feb. 14-21—Brooklyn, N. Y., Ninth Annual Brooklyn Automobile Show, 23rd Regiment Armory, Brooklyn Motor Vehicle Dealers' Association.
- Feb. 14-21—Detroit, Mich., Car Show, Detroit Auto Dealers' Association.
- Feb. 14-22—San Antonio, Tex., Automobile Show, San Antonio Automobile Trade Association. W. A. Williamson, manager.
- Feb. 15-20—St. Louis, Mo., St. Louis Automobile Show.
- Feb. 16-20—Manchester, N. H., Automobile Show, Academy (only show in state). J. J. Callahan, manager, box 808, Pittsfield, Mass.
- Feb. 16-21—New Haven, Conn., Annual Truck Show, Arena, New Haven Automobile Dealers' Association.
- Feb. 16-21—Des Moines, Ia., Annual Automobile Show, Des Moines Automobile Dealers' Association, Ford Factory. Dean Schooler and C. G. Van Vliet, managers.
- Feb. 16-21—Kansas City, Mo., Fifth Annual Show, Kansas City Tractor Club. Guy H. Hall, manager.
- Feb. 16-21—St. Louis, Mo., Motor Car Show, St. Louis Automobile Manufacturers & Dealers' Association. Robert E. Lee, manager.
- Feb. 17-21—Kalamazoo, Mich., Car and Truck Show, Kalamazoo Automobile Dealers' Association.
- Feb. 19—Kansas City, Mo., Tractor Dinner, Society Automotive Engineers.
- Feb. 19-21—Salem, Ore., Annual Automobile Show, Salem Dealers' Association. F. G. Delano, manager.
- Feb. 20-27—Albany, N. Y., Annual Automobile Show, Albany Auto Dealers' Association, State Armory.
- Feb. 21-28—San Francisco, Cal., Fourth Annual Pacific Automobile Show, Motor Car Dealers' Association, Exposition Auditorium. G. A. Wahlgreen, manager.
- Feb. 21-28—Ottawa, Canada, Motor Show.
- Feb. 22—Los Angeles, Cal., Inaugural Races, Los Angeles Speedway Association, New Speedway at Beverly.
- Feb. 23-27—Reading, Pa., Car Show, Reading Automobile Trade Association.
- Feb. 23-28—Wichita, Kan., Car Show, Wichita Motor Trade Association. Henry B. Marks, manager.
- Feb. 23-28—Elmira, N. Y., Annual Automobile Passenger Car Show, Elmira Automobile Club, State Armory. H. S. Bryan, manager.
- Feb. 23-28—Grand Rapids, Mich., Motor Car Show, Automobile Business Association, Furniture Exposition Building. M. D. Elgin, manager.
- Feb. 23-28—Automobile show, benefit of Co. F, Massachusetts State Armory, Pittsfield, Mass.
- Feb. 23-28—Louisville, Ky., 12th annual convention, Automobile Dealers' Association, First Regiment Armory.
- Feb. 23-28—Portland, Ore., Winter Automobile and Truck Show, Portland Automobile Trade Association. M. O. Wilkins, manager.
- Feb. 23-28—Bethlehem, Pa., Sixth Annual Lehigh Valley Show, Coliseum. J. L. Elliott, manager.
- Feb. 23-28—Duluth, Minn., Car Show, Automobile Dealers' Trade Association. W. F. Daly, manager.
- Feb. 23-28—Springfield, O., Car and Accessories Show, Memorial Hall, Springfield Automobile Trades Association.
- Feb. 23-28—Waterbury, Conn., Automobile Show, Auditorium. Guy A. Parsons, manager.
- Feb. 23-March 6—Birmingham, England, British Industries Fair.
- Feb. 23-March 6—Utrecht, Holland, Fourth Annual Fair of Dutch Products.
- Feb. 24-28—Columbus, O., 1920 Automobile Show, Columbus Auto Show Co., Memorial Hall. W. W. Freeman, manager.
- Feb. 24-March 1—Kansas City, Mo.; motor car dealers' show, Convention Hall: exhibition of trucks, passenger cars and accessories.
- Feb. 25-28—Grand Island, Neb., Car and Accessory Show, Grand Island Automobile Dealers' Association.
- Feb. 25-28—Bloomington, Ill., Annual Automobile Show, Bloomington Automobile & Tractor Association.
- Feb. 25-28—Charleston, W. Va., Annual Automobile Show, Armory. M. L. Crowley, manager.
- Feb. 27—Waterbury, Conn., Annual Meeting Auto Dealers' Association.
- Feb. 28-March 6—Newark, N. J., Newark Automobile Show, First Regiment Armory. Claude E. Holgate, manager.
- March—New York City, Airplane Meeting, Society Automotive Engineers.
- March—New Orleans, La., Fashion Show.
- March—Jersey City, N. J., Automobile Show.
- March—Topeka, Kan., Automobile Show. L. W. Earner, secretary, 221 North Kansas Avenue.
- March—Madison, Wis., Annual Automobile Show, Automotive Division, Association of Commerce. Don E. Mowry, manager.
- March—Adelaide, Australia; all-Australian exhibition of motor vehicles, airplanes, engines and automotive equipment.
- March—London, England; motor boat, marine and stationary engine exhibition.
- March 1—Fort Smith, Ark., Annual Meeting, Auto Protective Association.
- March 1-6—Eighteenth annual automobile show of Buffalo Automobile Dealers' Association, Broadway Auditorium.
- March 1-6—Perth Amboy, N. J., 18th Automobile Show, Auditorium.
- March 1-6—Scranton, Pa., Car, Truck and Tractor Show, Armory, Scranton Motor Trades Association. Hugh B. Andrews, manager.
- March 1-6—St. Joseph, Mo., Annual Automobile Show, St. Joseph Automobile Show Association, Auditorium. John Albus, manager.
- March 1-6—Omaha, Neb., 15th Annual Automobile Show, Omaha Automobile Trade Association, Auditorium. Clark G. Powell, manager.
- March 1-6—Portland, Me., Annual Automobile Show, Portland Automobile Association, Exposition Building. Howard B. Chandler, manager.
- March 1-6—Tulsa, Okla., Annual Automobile Show. Henry B. Marks, manager.
- March 1-6—Richmond, Va., Annual Automobile Show, Richmond Auto Trade Association, Gray's Armory. J. D. Kline, manager.
- March 1-7—Springfield, Mass., Annual Automobile Show, Springfield Automotive Dealers' Association.
- March 1-7—Grand Rapids, Mich., Truck Show, Automobile Business Association.
- March 1-8—Seattle, Wash., Automobile Show, Motor Car Dealers' Association, State Armory, William J. Coyle, manager.
- March 1-13—St. Louis, Mo., First Annual Mississippi Valley Exposition.
- March 1-15—Lyons, France, Spring Exposition.
- March 2-6—Little Rock, Ark., Show, Passenger Cars, Trucks, Tractors, Accessories and Farm Lights. A. W. Parke, manager.
- March 2-6—Denver, Col., Automobile Show, Stockyard Stadium, Denver Automobile Trade Association. Harrison Goldsmith, manager.
- March 3—Little Rock, Ark., Meeting Arkansas Auto Dealers' Association, Hotel Marion.
- March 3-6—Clinton, Ia., Annual Automobile Show, Clinton County Automobile Dealers' Association, Coliseum. Harry G. Finch, manager.
- March 3-6—Lancaster, Pa., Annual Automobile Show.
- March 6-13—New York City, Second Annual Aeronautical Exposition, Manufacturers' Aircraft Association, Inc., 71st Armory, 34th street and Park avenue. Walter Hempel, manager.
- March 6-13—Santa Rosa, Cal., Annual Automobile Show, Sonoma County Auto Trade Association. L. L. Futnam, manager.
- March 7-13—Muskegon, Mich., Car and Truck, Armory.
- March 8-13—Syracuse, N. Y., Annual Automobile Show, Syracuse Automobile Dealers' Association. Howard H. Smith, manager.
- March 8-13—Paterson, N. J., Fourth Annual Show, Fifth Regiment Armory. H. MacGinley, manager.
- March 10-13—Lebanon, Pa., Annual Motor Show, Automotive Trade Association of Lebanon, James Furniture Store Building. J. Paul Enck, manager.
- March 11-13—Pendleton, Ore., Annual Automobile Show, Pendleton Automobile Association, Happy Canyon Pavilion.
- March 13-20—Asbury Park, N. J., Car Show, Asbury Park Casino.
- March 13-20—Boston, Mass.; Boston automobile and truck show, Mechanics' building; Chester I. Campbell, manager.
- March 15—Little Rock, Ark., Annual Automobile Show, Liberty Hall.
- March 15—Oklahoma City, Okla., Automobile Show, Oklahoma City Dealers' Association.
- March 15-20—Wilkes-Barre, Pa., 10th Annual Showing of Passenger Cars, Automobile Dealers' Association of Wilkes-Barre, Inc.
- March 15-20—Great Falls, Mont., Fifth Annual Automobile Show and Motor Style Show, Montana Distributors' Association.
- March 17-18—Lake Charles, La., Semi-Annual Convention, Louisiana-Mississippi Automotive Trade Association.
- March 19-20—Chicago, Ill., Convention, National Association Motor Truck Sales Managers, Congress Hotel.
- March 20-27—Trenton, N. J., Annual Automobile Show, Trenton Automobile Dealers' Association, Armory. John L. Brock, manager.
- March 20-27—Pittsburgh, Pa., Show for Passenger Cars and Equipment, Automotive Association, Inc., Motor Square Garden. John J. Bell, manager.
- March 22-27—Torrington, Conn., Annual Automobile Show. James J. Callahan, manager.
- March 22-27—Wilkes-Barre, Pa., Commercial Car Show, Armory, Automobile Dealers' Association of Wilkes-Barre, Inc.
- March 22-27—Trenton, N. J., Car and Truck Show, Armory, Trenton Auto Trade Association.
- March 25-27—Fort Worth, Tex., Fourth Annual Convention, Texas Automobile Dealers' Association.
- March and April, 1920—Pretoria, South Africa; South African products exposition; overseas motor vehicles especially featured.
- April—Halifax, N. S., Annual Meeting, Nova Scotia Motor League.
- April 3-May 4—Buenos Aires, Argentine Republic; exposition of United States manufacturers.
- April 12-17—Hot Springs, Ark., Eighth Annual Convention; United States Good Roads Association; Fourth Annual Convention, Bankhead National Highway Association.
- April 29-May 1—Detroit, Mich., Fourth Annual Meeting and Convention, American Gear Manufacturers' Association.
- April-May—London, England; commercial vehicle exhibition, Olympia.
- May 15-20—San Francisco, Cal.; seventh annual foreign trade convention.
- May 31—Indianapolis, Ind., Seventh International 500-Mile Race, Indianapolis Motor Speedway.
- June—Omaha, Neb., Reliability Truck Tour.
- July—London, England, International Aircraft Exhibition, Society of British Aircraft Constructors, Olympia.
- July 4—Tacoma, Wash., Tacoma Speedway events.
- August—Paris, France, Grand Prix Race, Sporting Commission, Automobile Club of France.
- Oct. 6-8—Northampton, Mass., Annual Automobile Show, H. F. & H. Agricultural Society, Three County Fair Grounds. A. J. Morse, secretary.

7,691,523 Motor Cars Registered January 1.

ONE automobile to every two families in the United States by January, 1921! This is what is indicated by a conservative estimate of the number of cars that will be in service at that time, based on statistics just tabulated by experts of the B. F. Goodrich Rubber Co., Akron, O., after a careful survey of the field for the past few years. The Goodrich count on passenger cars and trucks now in operation is based on official figures from every state in the Union. The registration of motor vehicles at the close of the year 1919 was 7,555,269, and for the year 1918, 6,023,605, an increase of 1,531,664, or 26 per cent. The increase of 1918 over 1917 was 23 per cent. All dealer and motorcycle registrations have been carefully deducted.

Based on the pro rata increase for the past three years it may safely be predicted that there will be 10,000,000 motor cars in commission in 1921. This means approximately one car to every 10 persons, or, figuring $3\frac{1}{2}$ persons to a family, one car to every two households. Therefore, if you do not now own a car you may be encouraged by the fact that your chances of having one in the family

by next New Year's are 50 to 50, one chance in two.

Some Interesting Analyses.

An analysis of these statistics, which are given in tabulated form herewith, give some interesting information in regard to the comparative use of motor cars in various sections of the country, and the percentages of increase. The race been the states of Ohio and New York for supremacy in number of registrations, which for a time during the past year seemed to indicate that the western state might eventually surpass her metropolitan rival, has turned decidedly in favor of the Empire state, as she is leading by a comfortable margin, and also shows a greater percentage of increase.

It is also disclosed that five states have more automobiles and trucks registered within their individual confines than the entire continent of Europe. These states—New York, Ohio, Illinois, California and Pennsylvania—have a combined registration of 2,445,536—30 per cent. of the entire country's registration.

The State of Washington supersedes

PERCENTAGE OF INCREASE OVER 1918.

State	Pct. of Increase	State	Pct. of Increase
Alabama.....	34.3	Nebraska.....	12.5
Arizona.....	21.5	Nevada.....	14.0
Arkansas.....	19.3	N. Hampshire...	20.5
California.....	30.6	New Jersey....	24.0
Colorado.....	40.2	New Mexico....	26.3
Connecticut....	24.2	New York.....	31.0
Delaware.....	15.8	N. Carolina....	46.8
Florida.....	23.8	North Dakota...	1.7
Georgia.....	36.0	Ohio.....	22.5
Idaho.....	45.1	Oklahoma.....	25.8
Illinois.....	23.0	Oregon.....	19.8
Indiana.....	22.1	Pennsylvania...	5.2
Iowa.....	27.0	Rhode Island...	37.3
Kansas.....	20.4	S. Carolina....	22.7
Kentucky.....	33.2	South Dakota...	19.3
Louisiana.....	25.8	Tennessee....	23.8
Maine.....	15.2	Texas.....	31.9
Maryland.....	33.5	Utah.....	29.2
Massachusetts...	29.6	Vermont.....	18.9
Michigan.....	32.4	Virginia.....	30.3
Minnesota.....	27.0	Washington....	48.1
Mississippi....	20.0	West Virginia...	30.1
Missouri.....	30.1	Wisconsin.....	21.1
Montana.....	16.2	Wyoming.....	32.3

Maryland in the distinction of having the largest per cent. of increase. Maryland's 1918 increase over 1917 was 82 per cent., while Washington comes along with a 48 per cent. gain over 1918. North Carolina runs a close second, 47 per cent., in place of its 50 per cent. increase in 1918 over 1917.

The figures reflect that the automobile industry—the third largest in the country—is in an era of almost limitless expansion. It has converted those with pessimistic views of the future of the internal combustion engine as a means of vehicle propulsion into genuine optimists. It has forced nation, state and county to establish good roads building campaigns in equal stride with the trend of motor-dom.

The Average Sized Car.

In this connection it is interesting to note that recently a large New York banking house made a survey of motor car owners in an effort to determine the average sized car and the average price paid by the average American family for a car. This survey covered practically every state in the Union. Motor car owners in all walks of life, from bank presidents to mechanics, were called on. The make of car, its size and the price paid was tabulated, and when the record was complete it was found that the average sized car owned in America is a five-passenger and has a 105-inch wheelbase, and the average price paid was \$994.98.

Carrying this investigation of the average American car still further, statistics recently published by the National Automobile Chamber of Commerce show that 77 per cent. of all the motor cars in use in the United States today cost less than \$1000 each. A comparison of the figures gathered also indicates that the larger cities display almost the same ratio of expensive cars owned as smaller towns.

Prices Going Up.

An upward trend in price was shown at the big national automobile shows, this averaging a flat increase of about \$100. This is rendered imperative by the augmented cost of steel, coal and other materials, as well as by increased wages.

Automobile Registration Compiled by States

State	Registration Nov. 1, 1919	Estimated Registration Jan. 1, 1920	People Per Car
Alabama.....	60,001	65,000	36.84
Arizona.....	28,162	29,000	9.38
Arkansas.....	49,200	58,650	30.57
California.....	445,752	500,000	6.20
Colorado.....	102,135	104,000	9.75
Connecticut....	100,000	103,000	12.77
Delaware.....	16,000	16,200	13.39
District of Columbia.....	45,275	46,775	8.00
Florida.....	56,677	59,000	15.91
Georgia.....	125,555	126,000	23.29
Idaho.....	14,651	42,500	10.86
Illinois.....	475,650	478,000	13.21
Indiana.....	226,100	277,000	10.30
Iowa.....	356,766	365,000	6.09
Kansas.....	222,252	226,500	8.27
Kentucky.....	80,475	80,875	29.78
Louisiana.....	49,476	50,000	37.69
Maine.....	53,278	55,000	14.22
Maryland.....	99,705	101,000	13.70
Massachusetts...	241,620	245,000	15.64
Michigan.....	321,666	333,000	9.41
Minnesota.....	256,737	260,000	9.02
Mississippi....	47,000	50,000	40.02
Missouri.....	238,250	246,000	14.01
Montana.....	59,100	59,500	8.17
Nebraska.....	199,500	200,000	6.43
Nevada.....	9,300	9,500	12.07
New Hampshire...	29,755	30,000	14.87
New Jersey.....	185,763	190,000	16.21
New Mexico.....	17,851	18,000	24.27
New York.....	549,203	600,000	17.74
North Carolina...	102,000	111,000	22.21
North Dakota...	82,840	82,900	9.54
Ohio.....	505,500	510,000	10.33
Oklahoma.....	145,000	150,000	15.85
Oregon.....	82,330	83,350	10.65
Pennsylvania...	465,569	493,000	17.84
Rhode Island...	38,400	39,200	16.26
South Carolina...	67,750	70,000	23.72
South Dakota...	104,152	105,000	7.00
Tennessee.....	83,000	84,000	27.63
Texas.....	314,982	320,000	14.37
Utah.....	34,950	35,200	12.88
Vermont.....	26,572	26,900	13.61
Virginia.....	93,000	94,000	23.76
Washington.....	159,773	163,773	10.13
West Virginia...	49,764	50,200	28.66
Wisconsin.....	225,850	226,000	11.30
Wyoming.....	21,270	22,500	8.46
	7,412,047	7,691,523	

*The Car
of
the Year*



*A New England Product
Honest through and through*

**METZ SALES CORPORATION
BOSTON - MASS**

GEAR

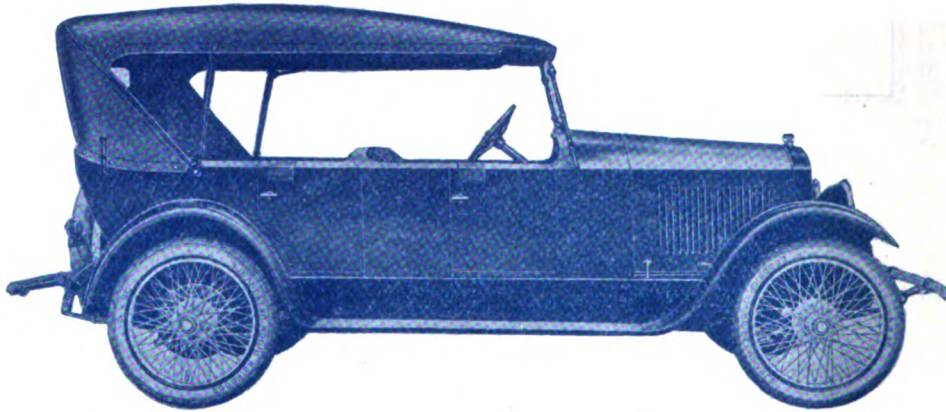
DRIVE

(When Writing to Advertisers, Please Mention the Automobile Journal.)

6

METZ MASTER SIX

6

*Elegance - Luxury*

Measured by any standard the METZ MASTER SIX is a car of distinction — in design, in finish, in appointments — a construction that admirably harmonizes.

No machine is more complete—no vehicle could be more carefully thought out and no car was ever perfected with greater regard for the requirements for every purpose.

Every quality has been considered. Every possibility has been appraised and the entire design has been developed to meet the demands of those who keenly discriminate.

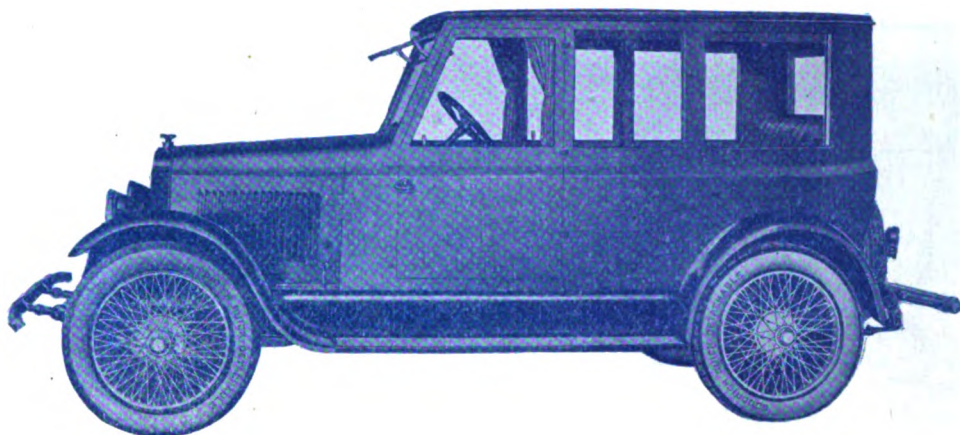
There is elegance in the proportioning of the body, in the graceful, sweeping lines, in its simplicity and dignity.

In every detail is evident the qualities that will make for motoring pleasure—for the driver who exacts flexibility and uniformity of acceleration on level ways and steep hills; who demands ease of control with wheel, pedal and lever; who wants perfect lubrication, small consumption of fuel, large tire mileage, and construction that means well nigh constant service with minimum of maintenance cost.

In the METZ MASTER SIX this means the fullest degree of comfort. That long, slow resiliency of the springs that absorbs all shocks and insures against fatigue; that depth of high grade leather upholstery that conforms to one's body and affords restful support; the ample space in which one can move unhampered and without cramping.

GEAR**DRIVE**

(When Writing to Advertisers, Please Mention the Automobile Journal.)

METZ MASTER SIX*Service - Endurance*

The utility and satisfaction realized is in ratio to the design and the construction.

The METZ MASTER SIX is the conception and the creation of the Master—METZ—the choice of units with reference to materials, workmanship, appearance, accessibility and simplicity—the products of the best specialists of the industry, and combining them into a perfectly balanced assembly that will afford every quality that makes for undoubted superiority.

Service in the METZ MASTER SIX means that this car will measure up to every standard by which satisfaction is determined. Whether it be appearance, finish, convenience of appointments, comfort of passengers, ease of control, power, flexibility, safety, tire mileage, economy of maintenance, the car is equal to any machine built, and is unequalled when all of these qualities are considered as applied to a single design.

Endurance is meant to apply to period of utility, to the service life that can be expected. The METZ MASTER SIX is built for years of use. Every construction unit is known the world over for quality. No car was ever designed with greater factors of safety. Only with such units could a car of equal strength and light weight be realized.

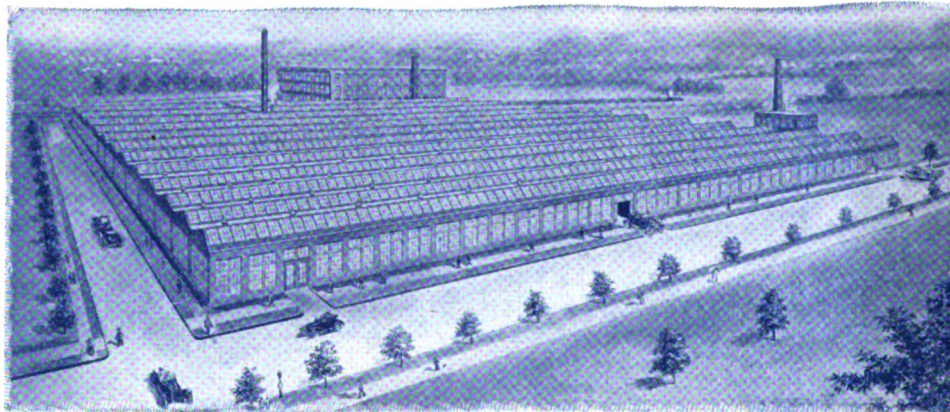
There is in the METZ MASTER SIX greater value represented than any other car, because METZ owners enjoy all the superior qualities at far less expense. The best measure is a knowledge of other cars. Make every possible comparison. See them all without regard to price. Then you will learn that on the basis of quality the METZ MASTER SIX has been rightly named the PERFECT CAR.

GEAR**DRIVE**

(When Writing to Advertisers, Please Mention the Automobile Journal.)

METZ MASTER SIX

Metz Main Factory, Where the Metz Master Six Is Built



Specifications of Metz Master Six

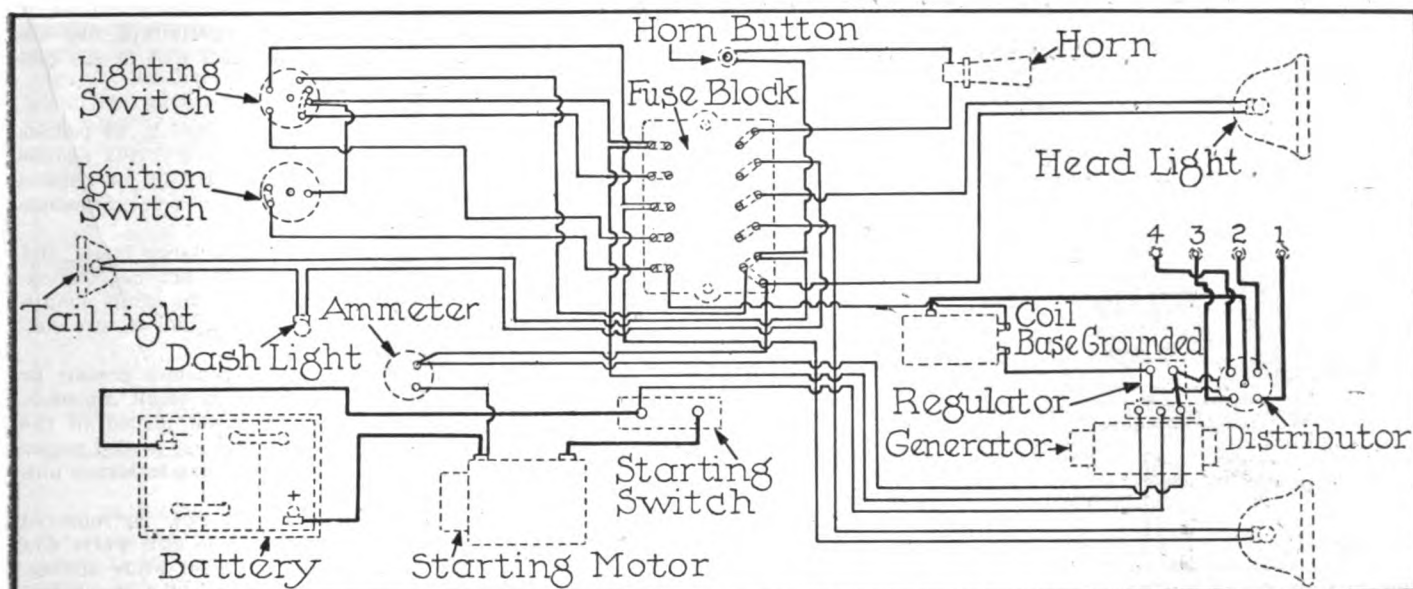
MOTOR—MASTER SIX, $3\frac{1}{2} \times 5$, L head type, six cylinder en bloc—unit power plant, with fully enclosed valves and detachable cylinder head. **FORCE FEED** and Splash. Positive pump circulation to all parts of motor. Pressure indicator on instrument board, gauge on crank case. **CARBURETOR**—STROMBERG Float Feed automatic type. Double jet, intake air heated, instrument board adjustment. **ELECTRIC EQUIPMENT**—WESTINGHOUSE two unit lighting and starting systems. **IGNITION**—CONNECTICUT distributor independent of generator. **BATTERY**—WILLARD 6 volts, 120 hour ampere. **GASOLINE SYSTEM**—15 gallon capacity tank carrier on rear. STEWART vacuum feed to carburetor, gasoline gauge. **STEERING GEAR**—Worm and gear type, irreversible 18" special finger MASTER SIX walnut steering wheel, spark and throttle control levers and horn button mounted on top. Left side drive. **CONTROL**—Center gear shift lever and emergency brake hand lever. **TRANSMISSION**—BROWN-LIPE, selective sliding gears; three speeds forward and reverse; nickel steel gears; special alloy steel shafts. Unit construction aluminum case. **CLUTCH**—BORG & BECK single 10" dry disc type, positive—yet disengaged by a gentle push on clutch pedal. **DRIVE**—Hotchkiss type; two universal joints and tubular propeller shaft. **LAMPS**—Special MASTER SIX electric head and tail lamps with double bulb for dimming, dash and rear compartment lamps. **RADIATOR**—Special MASTER SIX, Duplex cooler, copper tubes, cellular type, generous cooling surface, ample water capacity. **COOLING**—Water, positive centrifugal pump circulation. **FRAME**—Pressed steel channel section very wide in rear, tapering straight to front. **SPRINGS**—Special alloy semi-elliptic; front 38" long, 2" wide, rear 54" long, 2" wide, underslung; suspended directly under frame. **AXLE**—Front MASTER SIX, TIMKEN, single-piece drop-forging; I-beam section, heat treated TIMKEN bearings. **AXLE**—Rear MASTER SIX, TIMKEN, $\frac{3}{4}$ floating type, pressed steel housing, spiral bevel driving gears, accessible from rear, TIMKEN bearings. **BRAKES**—Service, $14\frac{1}{2}$ " external contracting on rear wheel; 2" wide with equalizer. Emergency internal expanding.

WHEELS—5 MASTER SIX wire wheels white enamelled—standard equipment for detachable straight side type tires. Artillery type optional. **TIRES**—32x4 GOODRICH, plain tread on front, and Non-Skid or Safety tread on rear. Six ply. **EXTRA WHEEL CARRIER**—Special design mounted on rear with safety lock. **LICENSE TAG HOLDERS**—Front—special arrangement on lamp spacing rod. Rear—integral with lamp. **BUMPERS**—Special MASTER SIX design front and rear. **BODY**—Five passenger, pure stream line MASTER SIX Colonial design—custom made, sturdy and extremely comfortable, roomy and of pleasing appearance, deep wide cushions, flush type well fitted doors designed to eliminate all rattle. **WINDSHIELD**—MASTER SIX two-piece ventilating and rain vision. **FINISH**—Highest grade custom coach work throughout. Royal blue with black enamelled guards and trimmings. White enamelled wire wheels, durable carpeted floor in rear, and special gray Linoleum covered floor in front, with running boards to match. Instrument board of dull finished walnut, with steering wheel special design to match and panel of walnut front of rear compartment. **UPHOLSTERING**—Straight piped, fitted upholstery. Genuine deep buffed black leather cushions and back. **TOP**—One-man, with curtains and top boot, curtains carried in pocket in top, using Dreadnaught water proof topping material. **SPEEDOMETER**—STEWART, flush type, mounted on instrument board, driven through special gears at rear of transmission. **WARNING SIGNAL**—Electric motor driven, operated from steering wheel. **EQUIPMENT**—MASTER SIX one-man top with top cover and quick adjustable interior fastening side curtains; MASTER SIX rain vision, ventilating windshield; speedometer; motor driven horn; headlights with auxiliary bulbs; dash, rear compartment and tail lamps; ammeter; oil pressure indicator on dash; bumpers front and rear; extra wire wheel on rear with special carrier and safety lock; special robe rail; pump; jack; tool kit in special pocket; tire repair outfit; ignition lock. **WHEELBASE**—120 inches, tread 56 inches. **WEIGHT**—2750 lbs. shipping weight; road weight with full tanks 2850 lbs. **PRICE**—Fully equipped, \$1895, F. O. B. Factory.

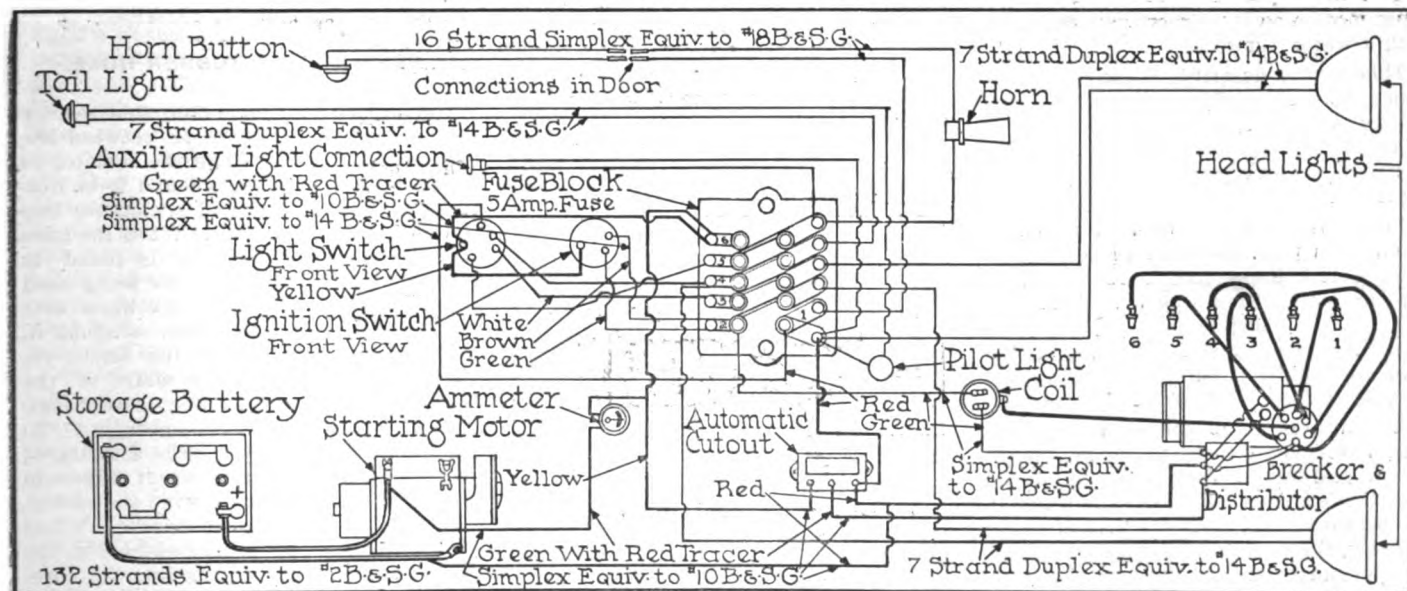
METZ SALES CORPORATION
Metz Building Boston .. Mass

(When Writing to Advertisers, Please Mention the Automobile Journal.)

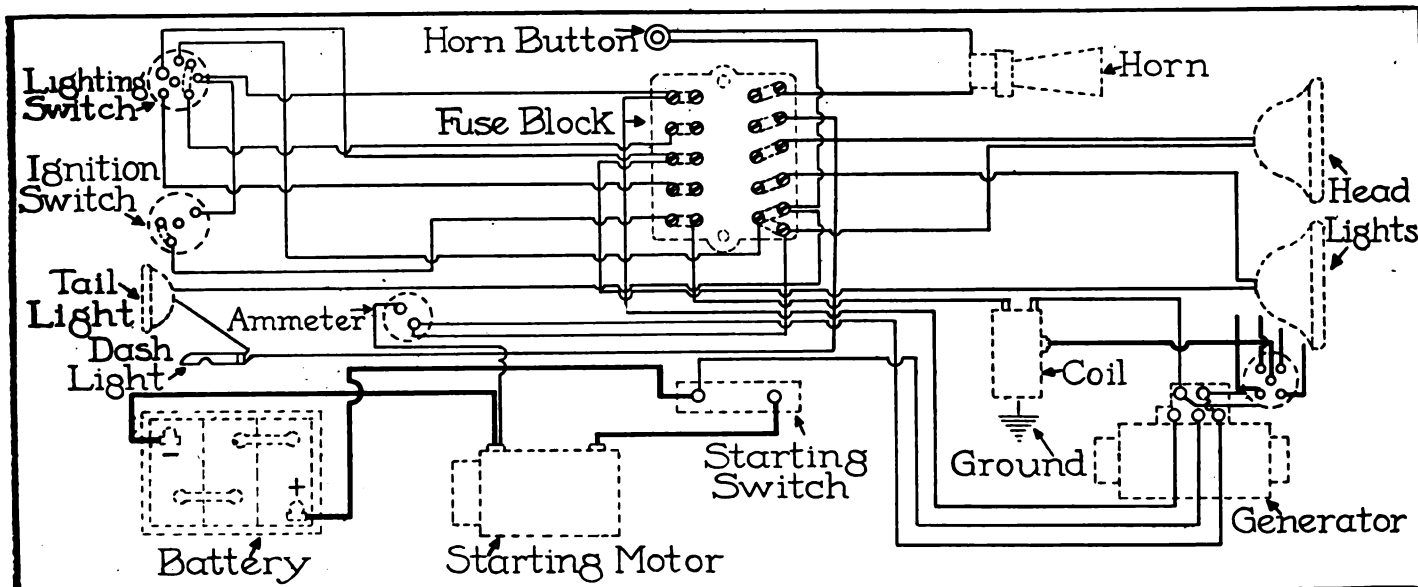
Monthly Wiring Diagram, No. 2



Reo 1917 Four-Cylinder Model T & U Remy Two-Unit System.



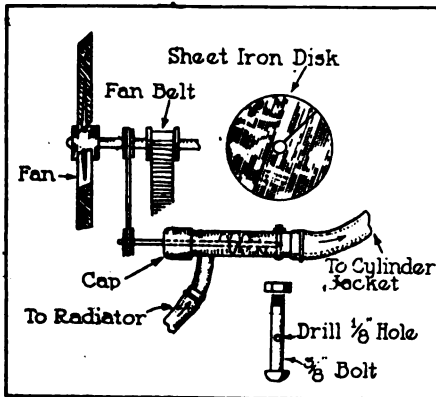
Reo 1917 Six Cylinder Touring Car and Roadster, Remy Two-Unit System.



Reo 1918 Model T & U Four-Cylinder Remy Two-Unit System.

Efficient Water Circulator for Ford Engine Is Easily Made

MORE than one case of engine trouble in the Ford car may be traced to sluggish water circulation. The water in the thermo-syphon system of water circulation is never in as



Showing How Water Is Circulated by the Pump.

rapid motion as it is in engines equipped with a water pump.

This article describes a simple device which may be easily made and inserted in the cooling system of the Ford or other car not equipped with a mechanically driven water pump, to create a constant and positive water circulation.

The device consists of a short length of one-inch pipe, several circles of sheet iron, a stiff brass rod, a one-inch pipe cap, a small pulley wheel, a short bolt and another short length of pipe. The latter is brazed into the opening in the pipe to lead the water from the hose connected to the bottom of the radiator.

A spiral, made of the sheet iron circles, revolves in the pipe, being turned by a round leather belt, which is slipped over the fan shaft. It forces the water in a constant stream from the bottom of the radiator, through the water jackets of the engine and back into the top of the radiator, where the water falls by gravity to the bottom of the radiator to be used over again.

Procure a six-inch length of one-inch pipe, which is free from flaws, and thread both ends. On one end screw a reduction nipple of the proper size to slip tightly into the hose leading to the engine. In the other end place a tight-fitting one-inch pipe cap. See that the joints are tight and then, with a sharp drill, bore a $\frac{1}{4}$ -inch hole in the center of the cap. This is to act as a bearing for the end of the shaft next to the pulley.

Next drill a $\frac{3}{8}$ -inch hole in the other end of the pipe, one inch from the end, as shown in sketch. Fit into the hole a $1\frac{1}{4}$ -inch bolt, $\frac{3}{8}$ inch in diameter, and in the center of this, equidistant from each end, or in the center of the pipe when in place, drill another hole $\frac{1}{8}$ inch in diameter. This is the bearing for the other end of the pump shaft.

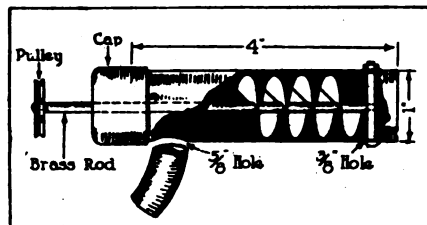
For the shaft, procure a seven-inch brass rod, which will fit snugly the $\frac{1}{4}$ -inch hole in the pipe cap. The other end of the rod is filed down to fit the $\frac{1}{8}$ -inch

hole in the bolt at the other end of the pipe.

For the spiral cut from medium heavy stock four circles of sheet iron of the correct size to fit snugly enough in the pipe to enable easy turning. The sheet iron should be well galvanized so as to take solder. Drill a hole in the exact center of each disc or circle to take the brass shaft and make a cut from the rim to the center, as shown in cut. These separate discs are bent so that when the ends are soldered together they will form a continuous spiral of four turns. They are then slipped over the brass shaft and soldered in place.

When the spiral is finished put the bolt bearing through the hole in the rear end of the pipe so that the hole in the bolt is in line with the pipe, making it tight by using heavy washers and screwing the nut down tight. Slip the spiral into place, passing the small end through the hole in the bolt. Cut two or three other leather washers to fit snugly on brass shaft, and of the right size to fit tightly into end of pipe cap. After slipping cap over end of brass shaft, screw cap on tight.

If the spiral turns easily and the bearings are properly aligned, take it apart, and cut a $\frac{3}{8}$ -inch hole in the pipe near



Showing How Pump Is Made.

the front end, as illustrated. This is to take the hose connection. The hose connection may be of pipe of the proper size, or heavy sheet iron bent to form, and either soldered in place or brazed.

Assemble the circulator again, make the hose connections tight with the usual screw clamps and note if the packings are water tight by filling the radiator. If everything is ready put the grooved pulley in place.

To make the pulley, procure a small, half-round grooved pulley wheel, or make one of babbitt and fasten it to the end of the brass shaft with a set screw. Connect it to the fan shaft with a round leather belt.

Aside from occasionally replacing the leather gaskets, the pump will be found to require very little attention. Since the pull of the belt is light this device will require no support save the hose connections. The speed of the spiral circulator is governed by the size of the pulley, which should be about that of the fan shaft.

The first American made electric automobile that was driven in Paris appeared upon the streets in 1896.

POLISH FOR CLEANING METAL.

To prepare a metal polish that will form an emulsion of cream consistency, and which will not precipitate, use the ingredients listed below and in the proportion specified:

Water	10 pounds
Pine oil	2 pounds
Sodium Oleate (soap)	2 pounds
Silex	5 pounds

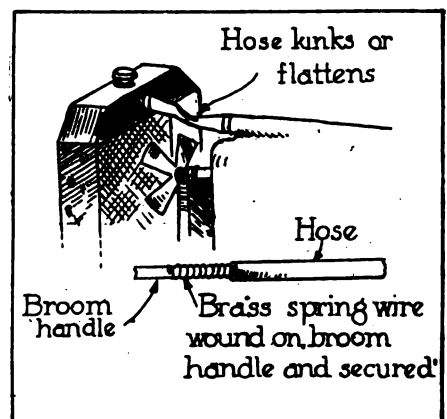
Heat the water in a large boiler and when the water is hot, but not boiling, add the sodium oleate, in small quantities at a time and continue to stir constantly while adding.

When the mixture becomes creamy or thick, add the silex in small amounts, until all of it has been placed in the mixture. Constant stirring is also necessary when adding the silex to insure uniform intermixture.

The mixture should now be removed from the heat, but while still warm add the pine oil, and stir well while adding. After the oil has been added the polish is allowed to cool, and after cooling can be poured into suitable containers.

REINFORCING RUBBER HOSE.

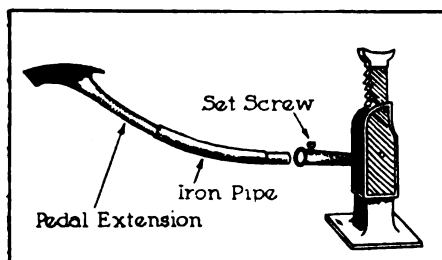
When making connections that require the use of rubber hose, as between the engine water jackets and the radiator in the cooling system, it is found to be necessary to make one and sometimes two sharp bends in the hose. When the hose is new no great difficulty is found in keeping it in shape, but after being used for a time the heat from the water acts upon the rubber of the hose, softening it, and causes it to sag at the bends, restricting the flow of the water of the cooling system and leading to overheating of the engine, loss of power, etc. To overcome the difficulty, make a spring of brass spring wire, forming it either in the lathe, using a bar to wind the spring, or simpler still a broom handle. When the spring is wound, straighten out the hose and insert the spring into the bore, using the broom handle to facilitate the insertion. After the spring is in place loosen it from the end of the handle and remove the handle. Hose treated in this manner is capable of taking sharp bends, holding its shape for an indefinite period, and will not cause sharp creases or bends in the pipe line.



Spring Wire Prevents Radiator Hose from Kinking.

EXTENSION HANDLE AND FOOT PEDAL FOR JACK.

An improvement of the regular jack handle is shown in the illustration. A section of iron pipe is bent slightly, the regular handle being cut off, leaving about six inches at the lower end. The iron pipe is slipped over the handle for about one-half its length and either pinned or brazed. The other three inches



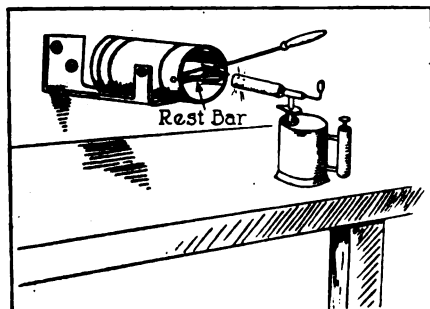
Extension for Jack Handle.

is to be fitted into the short handle of the jack and is held securely by a set screw in the hollow handle. To the opposite end of the iron pipe fit a pedal attached to a rod of iron or steel and either braze or pin the rod to the pipe. Such a device will be found particularly desirable where cars are equipped with gas tank and tire hanger on the rear. The jack is placed in position under the axle, raised by the short handle till the top comes under the axle housing, then the long handle is placed in the socket, fastened with the set screw and operated by the driver's foot. It is claimed that the use of this device eliminates the possibility of the operator soiling his clothes when raising or lowering the car and that it is long enough to clear the gas tank and tire hanger.

The length of the telescopic pedal and extension is about three feet six inches over all, but this can easily be varied to meet individual needs, the length given, however, being about right for average cars.

SMALL HOME-MADE FURNACE.

A small furnace for the amateur or small repair shops can be made by using a blow torch for the source of heat, and an old piston, mounted on a bracket fastened to the wall, with the open end of the piston pointing towards the front. The piston should be fixed at such a height that the flame from the blow torch will pass into the center of the opening. The blow torch is placed upon the bench, while the irons to be heated are placed within the opening of the pis-



Furnace Made from an Old Piston and Blow Torch.

Handy Home-Made Set of Tools for Removing Broken Studs

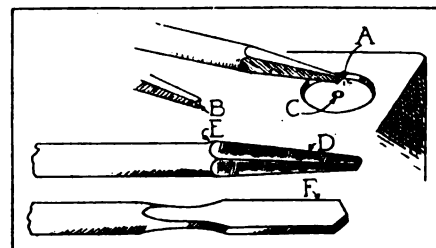
NEARLY every repairer has use at times for tools for removing broken studs. Yet often it is found that tools are not available unless the repairer makes them himself. Following are some suggestions as to the tools that can be used for this purpose and the method of application. The three-cornered cold chisel shown at A in the illustration may be forged from a section of a broken rat-tail file, the triangle end of this tool being shown at B. A good many broken studs may be "backed out" by the aid of this tool, but some hard screwed studs cannot be started with it, and other means must be resorted to. Drill a hole, smaller than the stud, down its center, starting at C at the point marked by the center punch.

Sometimes the hole must be drilled nearly to the bottom of the stud, but often one deep enough to admit one end of punch reamer D will prove sufficient. This tool may be forged square and filed flat on all four sides, but it is much better to grind each side concave as shown. To use this tool, drive it into the drilled hole, which has been made at C, as far as it will go without stretching or cracking the stud. Then hold the round end of the tool securely with one hand, applying a wrench at E, and usually the stud may be started and screwed out.

The tool shown at F is simply a flat drill, made left-handed, and often can be used for the removal of studs that will not yield to the punch A. This is ground to cut when rotated in the direction of the screwing out of a right-hand thread.

Start to drill a hole at C with left-hand drill F, and in a majority of cases the broken stud will come out, loosened by the pressure and vibration of the drill, the impulses of which are always in a direction to turn stud out. The tool D

may be used in a hole drilled by F, but in many instances there will be no need for it, as the broken stud can be removed without. There are times, however, when a broken stud will not yield to any of the methods given above, and other means will have to be employed. The sugges-



Removing Broken Studs and the Tools Necessary.

tion is made that hole C be drilled to the bottom of the stud, and followed by a larger size drill. Left-handed drills are especially desirable for this class of work, because often a stud, loosened by drilling away the part which bears in the bottom of the hole, can be turned out by a larger left-handed drill.

If the stud does not come out when as large a hole as possible has been drilled without doing damage to the threads, it will be necessary to take the tool A and cut a channel down the side to the bottom of the stud, passing through the thread, which it will damage only slightly, but not enough to unfit it for the new stud when screwed into place.

After the cut has been made the thin metal of the stud remaining may be crumpled up and loosened, driven out of the threads into the middle of the hole and then drawn out with the fingers. Several sizes of the left-hand drill F are desirable for various sizes of studs.

ton. The bracket is made of one-eighth inch sheet iron cut and bent as shown in the diagram, the lugs or ears being bolted to the wristpin holes in the piston. A hole is drilled on each side of the skirt of the piston and a rod put through for a rest bar on which the soldering iron is supported while it is being heated.

SILENT CHAINS.

The silent chains that are now so much used for camshaft and electrical unit drive should be treated exactly as if they were bearings. Each joining stud and rivet of the chain should be given systematic and careful lubrication. Chains that run in the open need to be oiled once a day. The oil should be applied to the inside, as this is the part that comes in direct contact with the sprockets.

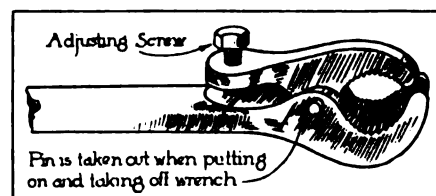
HOME-MADE PIPE WRENCH.

The home-made pipe wrench consists of two parts, a moving jaw and a combined

lower jaw and handle. The wrench can be made from a section of an old carriage axle or other good steel. After forging the tool to shape, as shown in the diagram, the teeth are filed in the jaws and the holes are drilled for the hinge pin and adjusting bolt.

The decided advantage of this type of cheap home-made tool is that it is an absolutely sure grip wrench; an enormous pressure can be exerted with the jaws by setting the adjusting screw up tight.

In using the wrench the pin is pulled out and the wrench placed in any desired position on the pipe, then the pin is replaced and the jaws tightened. The final job of loosening the obstinate joints is easy.



Pipe Wrench That Will Not Slip.

Mechanical Hints for Repair Shop and Garage Man

WELDING COMPOUND FOR IRON OR STEEL.

This process relates to the use of certain chemicals and ingredients which are dried and mixed to form a fine powder, and in this form are ready to apply to the iron or steel when these metals are in a heated state and nearly ready for welding.

The chemicals and ingredients form a flux which spreads over the surface of the metal and prevents the steel or iron from burning if it be slightly over-heated and in part so protects the heated surface from oxidation that a clear sound weld is easily secured, the flux being driven out from the joint by means of the hammer, carrying cinder or other impurities with it.

To prepare this welding compound use the materials listed below and in the proportions specified:

Boracic acid.....	11 ounces
Fused borax.....	4 ounces
Fine iron filings.....	3 ounces
Fine steel filings.....	4 ounces
Carbonate of potash.....	2 ounces
Chloride of ammonium.....	½ ounce
Potassium nitrate.....	3 ounces
Silver sand.....	½ ounce

All the chemicals and ingredients given above are dried on a tray over a low flame, and then finely powdered by tamping with a hammer, and when reduced to a fine powder are intimately mixed together by sifting.

After mixing the various ingredients, unless wanted for immediate use, they should be stored in air-tight metal containers.

In using the mixture the intended weld is first scarred in the usual way, and when the parts to be welded approach welding heat, withdraw each part from the fire and apply a small portion of the mixture to what will be the actual joint and then return it to the fire and bring the heat to a little less than the heat required for ordinary welding.

When the parts are brought together apply the hammer lightly at first and then more heavily to complete the weld. If any part of the scarf be imperfectly welded it can be reheated and some of the composition sprinkled over the defective joint and heated again to the desired point and the weld completed under the hammer.

WEAR MAKES SPRING CLIPS COME LOOSE.

After a car has been in service for some time there is a tendency of the spring leaves to fit somewhat more tightly together, owing to surfaces having become worn smooth. This makes the spring a little more compact by a few thousandths of an inch. The spring clips should therefore be tightened after a thousand miles or so of travel in the new car.

PREVENTING MOISTURE ON GLASS.

This process relates to the preparation of a compound, the object of which is to prevent the condensation of moisture upon glass surfaces. The compound will be found especially serviceable when applied to automobile windshields, windows of engine cabs and other glass surfaces where the condensation of moisture is always objectionable and sometimes a serious matter.

Use the ingredients under noted and in the proportions specified:

Beeswax	24 ounces
Japan wax.....	8 ounces
Glycerine	1 pound
Sodium chloride (common salt).....	1 ounce

The beeswax and Japan wax are reduced to a liquid state over a water bath or what is more commonly termed a double boiler cooker. While melting the salt is gradually stirred in.

The glycerine is poured into a metal tray which has been previously warmed, so as to prevent a too rapid solidification of the waxes, when they are added to the glycerine.

The liquified wax is then poured upon the glycerine in the tray and is rapidly and thoroughly mixed therewith. As soon as the mixture begins to set or harden it is at once packed into metal molds of the desired shape.

The glass surface to be treated should first be cleaned and dried and the composition rubbed slightly over the surface. The glass is then polished briskly with a slightly warm cloth until all traces of the compound disappear. The glass will then take on a highly polished aspect and the condensation of moisture upon the surface so treated is effectively guarded against.

WELDING OF PLATINUM.

Platinum does not oxidize when in a red hot state and may be joined without the use of welding powder simply by placing the red hot pieces upon each other and uniting them by blows of the hammer. Nevertheless the welding together of two pieces of platinum is a difficult operation, since platinum possesses the property of yielding up the absorbed heat with great rapidity and cooling off to such an extent that the two pieces will no longer be soft enough to be united. The joining of the hot pieces thus must be hastened as much as possible, it being advisable to allow the flame of the hydrogen gas blow pipe to act upon the pieces of platinum during the entire operation of welding.

USING A WRENCH.

In using a monkey wrench, never draw backward from the jaws, as this movement is likely to bend the bar of the wrench to which the handle and slidable jaw is attached. The wrench should always be pulled against the jaws.

REMOVING RUST FROM IRON PLATES.

A cheap and effective method of removing rust from corroded and pitted iron plates has recently been evolved as a result of many experiments. It consists in applying to the surface of the iron a mixture of two parts of finely crushed sodium bisulphate (sodium acid sulphate, $\text{Na}_2\text{SO}_4 \cdot \text{H}_2\text{SO}_4 \cdot 3\text{H}_2\text{O}$) and one part common salt, which is moistened just enough to make it cohesive. The moist mixture can be left on until the plate is clean, but the action is more rapid if it is scraped off every two or three hours and the iron scrubbed thoroughly with a wire brush and water. The treatment is repeated until the plate is clean. Usually 24 hours is sufficient to cleanse a badly corroded plate. When the plate is thoroughly clean it is well washed with an alkaline solution and dried quickly. A coating of paraffine (kerosene) is at once applied to protect the surface against oxidation. The metal is then ready for the paint or other protective covering. This method has been found to be more effective than hammering, chiseling, the use of wire brushes, or even a sand blast.

LUBRICATION HINTS.

When lubricating the car look for oil holes that are stopped up with mud and clean them out with a piece of wire. All holes should be covered with oil cups, but sometimes they are left open, especially on brake cross shaft and clutch pedal shaft support bearings. If the sediment is not removed the oil cannot reach the bearing surfaces.

Do you fill the universal joints about every 500 or 1000 miles? Perhaps you are wondering why the car is noisy in action. Do not wait until the joints squeak or develop back lash, but be sure to keep these hard working parts properly oiled.

STEERING WHEEL PLAY.

Watch the steering mechanism closely. Do not allow too much lost motion in the wheel. A careful inspection should be made from the wheels back to determine that all parts of the steering linkage are tight and properly adjusted. Periodical adjustment and lubrication will insure not only easier control of the car, but greater safety as well.

FROSTING GLASS.

A good frosting for glass that imitates ground glass quite well is made as follows: Sandarac, 18 parts; mastic, four parts; benzoi, 40 parts, and ether, 200 parts. Clean glass thoroughly before applying and flow the mixture over the glass.

It requires 28,000,000 tires to equip the passenger automobiles and motor trucks used in the United States.

DE COU IS GENERAL MANAGER

Announcement has just been made of the organization of the Fairfield Manufacturing Co., Lafayette, Ind., to manufacture differential and bevel gears for automobiles. The officers, all of whom are prominent in the Ross Gear & Tool Co., maker of Ross steering gears, are as follows:

President, D. L. Ross; vice president and general manager, J. W. DeCou; secretary, Edward A. Ross; treasurer, George C. Kummig; consulting engineer, David E. Ross.

The organization of the Fairfield Manufacturing Co. is the outgrowth of the increase in the business of the Ross Gear & Tool Co. A part of the factory of the latter concern has been devoted to the making of differential gears that will now be produced by the new organization, and the Ross plant will be devoted entirely to the production of steering gears.

All of the patents, machinery, etc., for making bevel gears, formerly owned and controlled by the Ross Gear & Tool Co., have been taken over by the Fairfield Manufacturing Co., which has taken possession of the plant formerly occupied by the Lafayette Engineering Co. and will immediately put it under full production.

BRISCOE CONTROLS BODY PLANT.

The Briscoe Motor Co., Jackson, Mich., has acquired the plant of the John Bohnet Co., Lansing, Mich. The Bohnet company has been one of the largest manufacturers of closed automobile bodies in the country and in taking it over the Briscoe company will have every facility for building all the bodies for the Briscoe closed models. The Briscoe company will make improvements and additions to this plant to take care of the 1920 production programme which, it is reported, will be double any year in the history of the company.

KENNEDY CORPORATION TO BUILD.

The Kennedy Corporation, headed by Joseph P. Kennedy of Baltimore, Md., and financed by capital supplied in that city, is to commence immediately the construction of a \$2,000,000 plant at Curtis Bay, a suburb of Baltimore, for the manufacture of automobile parts, this to be the first unit in a \$4,000,000 factory, the second to be built before the year is ended. Each unit will employ 1200 workers. The buildings will be of steel and concrete and modern in every respect.

DUFF JACK SALES CO.

The Duff Jack Sales Co., Ltd., has been formed, with headquarters in the Oxford Circus House, 245 Oxford street, London, W. 1, England, to represent the Duff Manufacturing Co. of Pittsburgh, Pa., in the British Isles, and has been given the exclusive agency in this territory for Duff and Barrett jacks.

While there are 250,000 miles of railway in the United States, the motor car has the use of 2,500,000 miles of highway.

Business Booming for Body Builders



J. W. DeCou, Vice President and General Manager, Fairfield Manufacturing Co.

AS A result of the enormous expansion in automobile production in the United States, the builders of motor car bodies are fairly swamped with business. Only a comparatively few of car manufacturers other than the Ford Motor Co., build their own bodies. An indication of this unprecedented demand for bodies which American builders have been called on to meet is shown when it is stated that the production of passenger cars increased from 926,388 in 1918 to 1,586,787 in 1919, and it is estimated that during the current year more than 2,000,000 more will be turned out. The number of trucks increased from 227,250 in 1918 to 305,142 in 1919, with an estimated output of 425,000 in 1920.

The Fisher Body Corporation, control of which was recently acquired by the General Motors Corporation, has 22 plants in Detroit, one in Canada and operates as a subsidiary the recently organized Fisher Body Ohio Co. with plants at Cleveland. The Ohio company is capitalized at \$10,000,000 preferred stock and 20,000 shares no par value common stock. From funds derived from the sale of preferred stock \$6,000,000 is being expended on plant and equipment. F. J. Fisher, president of the company, says the Cleveland plant will be the largest of its kind in the world and estimates that within two years the Ohio company alone will be doing a business of \$25,000,000 a year. The Detroit company for the year ended April 30, 1919, returned net profits of \$1,600,000 after all charges and federal taxes.

The Mullins Body Corporation.

The Mullins Body Corporation was incorporated last year to take over the business and assets of W. H. Mullins Co., Salem, O. In addition to automobile bodies this company turns out automobile parts and small steel boats. Of the authorized capitalization of \$1,000,000 preferred stock and 70,000 shares of no par value common stock, all the preferred

and 30,000 shares of common were sold at the time the new company was organized. Within four months so much new business was acquired, mainly for automobile bodies, that the remaining 40,000 shares of common stock were sold to secure additional working capital. Net earnings are running at the rate of \$72,000 a month before taxes, and unfilled orders total approximately \$600,000. On this basis net earnings for the current year will probably exceed \$13 a share on the common stock before taxes.

C. R. Williams Body Co.

C. R. Williams Body Co., whose main plant is at Detroit, found its capacity of 500 bodies a day there insufficient to meet its requirements. Consequently it purchased a large tract of land at Bay City, Mich., on which it has erected milling, wood working and dry storage plants, and the Detroit plant is now used for metal work, assembly and delivery. No figures on last year's business have been made public, but it is known that 1919 sales were greatly in excess of the \$5,675,000 sales reported for 1918.

The Rubay Co.

The Rubay Co. of Cleveland, an offspring of the original Leon Rubay concern of France, was recently incorporated in Delaware with a capitalization of \$1,000,000 preferred stock and 30,000 shares of no par value common stock. With \$850,000 derived from the sale of part of the preferred stock extensive plant extensions are being made. It is estimated that the company has unfilled orders on its books of approximately \$4,500,000,000.

Lang Body Co.

Lang Body Co. of Cleveland is trebling its capacity through the addition of plants now nearing completion, which will be paid for from the proceeds of the sale of \$1,000,000 new preferred stock. When the new buildings are finished the Lang company will be able to handle from \$4,000,000 to \$5,000,000 worth of business a year.

Superior Body Co.

Superior Body Co., Rahway, N. J., has been capitalized at \$500,000, all common stock of \$5 par value, to take over an old copartnership of the same name. The company is completing the construction of additional plants which are required to help fill the \$8,000,000 worth of orders now on hand.

Other Body Plants.

There are a number of other automobile body builders in the United States of whose activities no details have been given out except the fact that they are all planning increased production and plant extensions. It is the consensus in the automobile industry that the shortage of motor cars cannot be met in less than a year. With every automobile maker working on schedules of from 25 to 100 per cent. increased output this year, the builders of bodies will have their hands full supplying the demand for their product.



TIRE INDUSTRY AND TRADE

ANNUAL MEETING STERLING TIRE CORPORATION.

At a meeting of the board of directors of the Sterling Tire Corporation, held at its office in Rutherford, N. J., Dec. 26, A. A. Altschuler of Hackensack was elected president to succeed Spencer Welton, resigned. Mr. Altschuler has been a director of the corporation for several years and is also president of the International Fidelity Insurance Co. and a director of the Union Trust Co. of Jersey City.

Succeeding Mr. Welton on the board of directors is Frank A. Ball, vice president of the L. S. Starrett Manufacturing Co., Athol, Mass. The other officials remain as follows: Vice president and general factory manager, Otto Basten; treasurer, Joseph A. Miller; secretary, Bartlett Greene; chairman, executive committee, Charles Austin Bates.

The Sterling Corporation reports that it has just closed the most successful year in its history, having changed its selling policy from retail to wholesale and opened accounts with over 5000 dealers from Maine to California. It has unfilled orders and contracts for 1920 delivery amounting to over \$2,000,000. During the past year an export department has been developed and Sterling tires are now sold in more than 30 foreign countries. The plant in East Rutherford has been materially enlarged and now has a capacity of 1200 tires a day. Further additions are planned to bring the production to 2000 a day before the end of 1920, which will mean the employment of double the number of men at work in 1919.

Appoints New Distributors.

The Sterling Tire Corporation, Rutherford, N. J., announces the appointment of the following distributors: George L. Watkins of Birmingham, Ala., for the State of Alabama; West Coast Rubber Co. and Oregon Rubber Co., both of Seattle, Wash., for the northwest section; Charles A. Warren, San Francisco, for northern California, with headquarters at 575 Market street. Mr. Warren has appointed the firm of Maudrell & Walfish to care for the distribution in the city of San Francisco.

The Ailing Rubber Co., Albany, N. Y., has increased its capital from \$225,000 to \$450,000.

OLDFIELD TIRE EXPANDS.

On account of the record-breaking growth of the Oldfield Tire Co.'s business, making it impracticable for him to longer discharge the combined duties of president and general manager, Barney Oldfield announces the addition to his organization of H. A. Grubb, a tire industry executive of ripe experience and wide acquaintance. Mr. Grubb's connection with the Oldfield company as vice presi-



H. A. Grubb, Vice President and Acting General Manager, Oldfield Tire Co.

dent and acting general manager, with headquarters at Cleveland, will enable President Oldfield to devote an increased proportion of his time to supervision of production and to the company's sales activities in the field.

The Oldfield company has added to its directorate besides Mr. Grubb, O. C. Wagner, credit manager, and C. L. Reely, advertising manager, who also assumes the duties of assistant sales manager.

KEYSTONE SALES INCREASE.

The gross sales of the Keystone Tire & Rubber Co., New York City, for the past year amounted to \$9,806,000, compared to \$6,172,000 in 1918.

GOOD MARKET FOR TIRES IN ENGLAND.

It is reported that manufacturers here who are in a position to export motor car and motorcycle tires at the present time will find the British market worthy of attention. Makers of cars and cycles in that country are faced with what might almost be termed a tire famine. While it is realized that the present tire shortage is world wide, it is evidently more acute in Europe than in this country, as central Europe has not yet recovered from the effects of the blockade, which prevented the coming in of both crude rubber and the finished product during the war.

In the United Kingdom it is reported that the output of cars and cycles is seriously impeded by the dearth of tires, with no immediate prospect of relief. The growers of rubber, although otherwise in a position to ease the situation are hampered by the meagerness of shipping facilities, and it is anticipated that many months must elapse before factories can expect appreciable relief in the way of raw material.

Rubber growers, as well as manufacturers, realize that the restoring of production to a pre-war basis will not solve the problem, as the demand for motor cars is so much greater than in 1914, and more raw material must be produced if the supply is to keep pace with the demand.

INTERNATIONAL TUBE CORPORATION.

The International Puncture Proof Tube Corporation has been incorporated at Wilmington, Del., to manufacture puncture proof inner tubes for automobile tires, etc., with capital of \$5,000,000. The incorporators are Samuel B. Howard, George V. Reilly and Robert K. Thistle, all of New York.

ASSOCIATED TIRE STORES.

The Associated Tire Stores Corporation has been incorporated at Dover, Del., with capital of \$30,000,000, to manufacture tires, etc. The incorporators are T. L. Croteau, M. A. Bruce and S. E. Dill, Wilmington, Del.

STOCK OF HOOD RUBBER COMPANY OFFERED.

The Hood Rubber Co. is offering stockholders an opportunity to subscribe to \$1,000,000 seven per cent. cumulative preferred stock of the Hood Rubber Co. at \$100 a share. A contract has been entered into between the two companies whereby the rubber company agrees to pay a net commission of one per cent. after the payment of all expenses and liability incurred in the conduct of the business.

Based on sales of \$25,000,000 for 1918 and 1919, from this one per cent., the Hood Rubber Products Co. would receive \$250,000, or three times the requirements of the preferred stock. Under the contract the Hood Rubber Co. guarantees \$100,000 annually. All the stock was bought by the Hood Rubber Co., the preferred now being offered to stockholders, while the \$500,000 common will be retained. In case of liquidation the preferred is entitled to \$110 a share, and is also callable in whole or in part at \$115 a share.

WATKINS HEADS GLOBE TIRE.

L. Arthur Watkins, one of Boston's best known automobile accessory men, and especially prominent in the tire trade, has been promoted to be New England district manager of the Globe Tire Co. He will make his headquarters at Boston. Mr. Watkins was, in 1911, chosen president of Motor Accessories, Inc., operating as John & Arthur. In 1916 he resigned from the company and enlisted in the army for the duration of the war. In January, 1919, he returned to Boston and became associated with the Globe Tire Co. as traveling representative. As head of the Globe company for this district he succeeds A. H. Lane, who goes to factory headquarters as distributors' representative.

RECORD REBUILT TIRES.

The Record Tire Co., New York City, conducts its business on the principal of guaranteeing all the tires put out for 5000 miles, this policy insuring that no tire will be rebuilt unless, after tearing down, the carcass is found to possess sufficient strength to make good on this amount of mileage.

Another way in which the company protects itself is by not selling state manufacturing rights, but by handling all tires to be rebuilt in its own factories and by its own expert workmen.

DUNLOP TO BUILD AT BUFFALO.

The newly incorporated Dunlop, America, Ltd., an extension of the British Dunlop Co., is to erect a tire plant and cotton mills in Buffalo, N. Y., at a cost of about \$25,000,000. All the rights of the American Dunlop Tire Co. have been acquired by Dunlop, America, Ltd., but it will be operated by an American executive staff, and the board of directors will be made up of Americans, as well as representatives of the British interests.

Goodyear Co.'s Relief Association

The system by which the Goodyear Tire & Rubber Co., Akron, O., conducts relief work among the 25,000 employees in its Akron factories, has proved so successful that the company has received many inquiries from other industrial concerns in regard to its method of operation.

Over 15,000 employees, two-thirds of the total enrollment in Akron, carry insurance in the men's relief association. Each member pays dues of \$6 a year in return for which he receives a \$1000 policy and is entitled to \$8 a week when laid up by accident or illness. Without additional cost the policy is increased \$500 every five years until it reaches a maximum of \$3000. This extra insurance is in reality a bonus for long service.

The woman's branch of the relief association has 1300 members.

An idea of the benefit such a plan is to Goodyear employees and their families may be gained when it is known that in

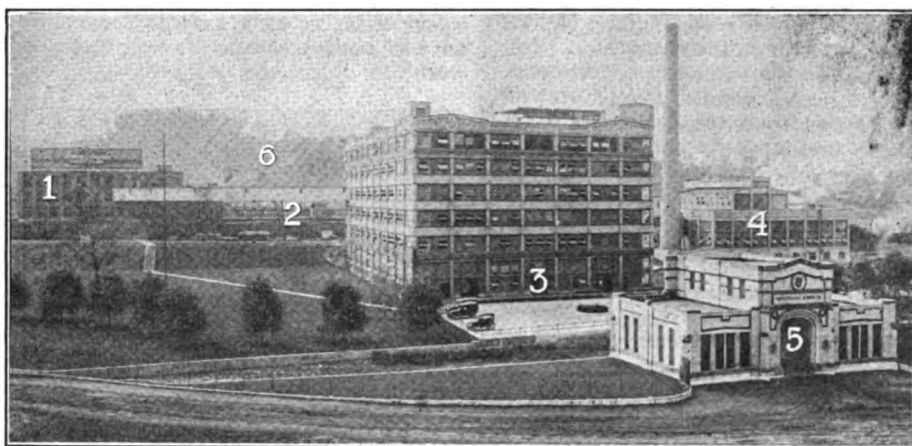
UP-TO-DATE PLANT OF PENNSYLVANIA RUBBER CO.

The accompanying illustration of the up-to-date plant of the Pennsylvania Rubber Co. at Jeannette, Pa., shows the extent of the company's activities at the present time. This concern has built up its organization, step by step, from the inside, and has been strengthened by each successive year of its progress by its policy of maintaining its standard of a quality product manufactured by well-paid, self-respecting employees, under a rigid system of inspection, and the adoption of an automatic selling plan guaranteeing protection and profit proportionate to the efforts expended by the dealer.

The growth of the business in 10 years can best be noted from a comparison of the following figures for 1910 with those of today:

1910—Number of employees, 460; daily production of automobile tires, 120; of tubes, 120.

1920—Number of employees, 2849; daily production of automobile tires, 3000; automobile tubes, 5500; bicycle tires, 3000. Claimed to be the largest



Plant of the Pennsylvania Rubber Co. at Jeannette, Pa.: 1, Shipping Building; 2, Original Building; 3, Main Office and Factory; 4, Power House; 5, Time Office and Hospital; 6, Paruco Park Homes-for-Workmen Allotment.

the six months ending Jan. 1, 1920, the association paid out \$12,000 for deaths and \$11,988 for accidents and sickness.

The membership increased over 7000 in the past five months and it is expected that 1200 more will become members during January.

Engages in Cotton Growing.

Cotton growing in Arizona is no longer in the experimental stage, as thousands of acres are under cultivation, producing large amounts suitable for tire fabric. Irrigation has turned sandy wastes into fertile plantations that produce cotton equal in quality to Sea Island. The Goodyear Tire & Rubber Co., Akron, O., was one of the pioneers in this field, and so successful have been its efforts that it has established connections in the Imperial valley of southern California and construction will soon begin on gins in Calexico, Calapatria and probably El Centro.

The Goodyear Tire & Rubber Co., Akron, O., has let contracts for a \$200,000 dormitory to house 175 of its women employees from out of town.

producer in America of strictly domestic tennis balls. New buildings in course of construction will triple present production.

In order to relieve the congestion in housing conditions, which has accompanied the phenomenal growth of the company, the company acquired a plot of 200 acres of land extending from the factory to the Lincoln highway and has inaugurated a building plan whereby fine homes of brick, stucco and frame construction, supplied with all modern conveniences, are sold to its workmen on a modest monthly payment basis. This section is now known as Paruco park, and the number of houses completed or under construction is 71. The minimum of houses planned is 1200.

U. S. RUBBER PURCHASE.

The United States Rubber Co., New York City, announces the purchase of the entire plant, equipment, stock, good will and business of the Dolgeville Felt Shoe Co., Dolgeville, N. Y., manufacturer of felt shoes and slippers.

Running Car on Low-Grade Fuel

SO MANY articles have been written in the past warning motorists in regard to problems presented by the use of the fuels now being supplied, with their high percentage content of low-grade distillate, that another article along this line might seem out of place. It must be remembered, however, that the army of car drivers is constantly being recruited by new motorists who perhaps have not had an opportunity to become informed, so it may be well to reiterate, from time to time, a few essential points in regard to adapting the operation of the car to the grade of fuel that it may be necessary to use.

Passage of Unburned Fuel.

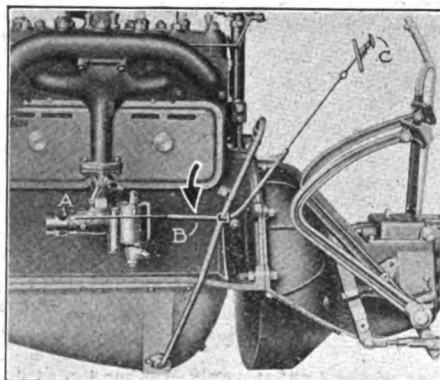
Much has also been published about engine lubrication and the danger of the oil in the reservoir becoming deteriorated by the passage of unburned fuel by the piston rings. To guard against this possibility, it is necessary that the motorist use judgment in the use of the choking device found on his car. In nearly all components of this nature there is employed some method of closing the air inlet to the carburetor. This action allows the engine to operate similar to a multi-cylinder pump, drawing the raw fuel from the carburetor bowl, through the intake manifold past the valve openings, as the engine is turned, and entering the combustion chamber, still in the raw state. The engine is usually cold when methods of this kind are used, consequently the raw fuel is not completely burned, the result being that the unburned fuel has a tendency to work by the swift moving pistons, to incorporate itself with the oil film surrounding them adhering to the walls of the cylinders thinning this oil and passing on down into the base of the engine.

Use of Primer.

Happening a few times probably no harm would be done, but the average motorist is anxious to start his car as quickly as possible when it is cold. He not only is in a hurry, but he knows that using the primer warms the engine more quickly and gets the car going in the quickest possible time. Consequently, he leaves the choker pulled out as far as it will come and starts off. He may drive for several miles before he notices that the engine is overheating or he may be talking with a passenger and not notice that the car is running sluggishly. What is the result? Before the engine showed signs of overheating or running sluggish, the raw fuel was thinning the lubricating oil. If this practise is continued for a number of times the motorist will soon find that the oil in the base of the engine is very thin, smells strongly of kerosene and that the engine seems to heat quickly as though short of oil. The proper cure for this defect is to remove the plug in the base of the engine reservoir, drain out, rinse out with gasoline or kerosene and refill with new oil. Repeating this treatment at 500 mile intervals will obviate poor lubrication, especially during cold weather.

Judicious Use of Choker.

A judicious use of the choker will help considerably, especially during cold weather, in retaining the lubricating qualities in the oil. When first starting the engine pull the choker way out. After the engine is started gradually work the choker back, keeping it at a point where the engine runs fairly even. Try pushing it way in towards the dash and pulling it out part way as the engine drops off, allowing the engine to pick up again. But as soon as the engine becomes warm, that is, when the water in the cooling system has reached its normal temperature, close the choker entirely if it is possible to do so and still have the engine run without skipping. If this cannot be done pull out slightly till the skipping of the engine disappears. The closing of the choker allows the air shutter, connected to the choker pull wire, to open, causing the engine to take in the warmed air from the jacket around the exhaust pipe. That is the way the manufacturer intended the engine should operate and unless something is radically wrong with the choker or its connecting wire or shutter, that is the way it should work.



A, Choker Shutter; B, Copper Tube Through Which Choker Wire Passes; C, Choker Button.

During very severe winter weather it is advisable to provide some protection for the air opening of the carburetor. There are very few cars that are not provided with a heating attachment in some form and a single air opening into the carburetor. Other cars are equipped with carburetors having two or more air openings, only one of which is connected with the heating attachment. Where this is the case, provision must be made to partially shut off the inrush of cold air. This may be done by fitting a section of card board across the lower part of the radiator core, at the same time protecting the coldest part of the radiator and preventing it from freezing. Still another method is to fit one of the numerous shutter attachments or hoods that may be purchased from supply houses. These will help to keep the cooling medium warm, facilitate starting, save the starting battery and cause the engine to more completely consume the raw fuel as it enters the combustion chambers of the engine.

HOW TO AVOID THE RISK OF ENGINE SEIZURE.

When cars have not been in use for a considerable time it is well to remove any possibility of seizure of the pistons occurring when starting the engine. The risk is that the cylinder walls and pistons may have become dry and that when the engine is first started and runs under its own power, fresh oil may not be splashed on to the cylinder walls in sufficient quantity to prevent the pistons from seizing.

If a car has been laid up for more than a couple of months, it is advisable to introduce a plentiful supply of oil into the cylinders through the valve caps or spark plug orifices. Care should be taken that the oil does not run out through the open valves, but that it is applied to the top of the pistons. The quantity to be introduced is, as a rule, two or three tablespoonfuls, which should be sufficient, and when the engine is subsequently started (with a full supply of fresh oil in the sump) a great deal of blue smoke will issue from the exhaust, but this will soon pass off.

The engine should not be run at a high speed for five or 10 minutes after it has been started, to give time for the oil to circulate to the bearings. On the other hand the engine speed should not be very low, but one that will be sufficient to cause the lubricant to be thoroughly thrown up by the connecting rod ends to the various parts.

The condition and height of the lubricant in the gearset and differential should not be overlooked at this time, as these units are of equal importance to the engine, and the condition and quantity of the lubricant should be carefully examined.

If the lubricant has become very heavy and thick it will not, of course, so readily find its way into the various gearset and differential bearings of the power plant.

FITTING ROLLER BEARINGS.

In replacing roller bearings on a front wheel spindle on which it is a tight fit, many owners slip the bearing on to the taper end of the spindle and then put on the wheel, using it as a hammer to drive the bearing home. This is a poor method, as the bearing is likely to be injured. The hardened shoulder of the inner race, which receives the brunt of the blows, is especially liable to be broken.

DRIVING AWAY FROM CURBS.

It is quite often the case that a car is parked so close to a curbing that it cannot be driven away. When this occurs place the jack under the center of the front axle, raise the car a few inches and then push the car off the jack sideways, away from the curb. This will give room to turn the wheels out enough to drive away.

In the past 20 years 7,700,000 automobiles have been produced in the United States.

TIRE INFLATION.

Many motorists labor under the impression that they should run their tires under-inflated during the warmer summer months and fully inflated during colder winter months. This practise has become so general that one of the larger tire manufacturing companies has recently carried out a series of tests to determine the wisdom or fallacy of this practise.

It remained for the B. F. Goodrich Rubber Co., Akron, O., to test this theory. A 34x4 inch tire, for which makers prescribe a 70-pound pressure, was used for the test. Air at various temperatures was pumped into the tires and they were then run at excessive speeds under severe road conditions. The changes in pressure were found to be negligible. Goodrich recommends an even pressure the year round with adherence to the pressure designated for the various sizes of tires.

Frequent observations conducted by experts of the company have demonstrated that the vast majority of motorists keep their tires under-inflated. Even if hot weather makes a slight difference in pressure it would be policy to risk it rather than take the chance of having the tire under-inflated. Of the two the latter is far the worse and more universal.

In this connection it is well to remember that air pressure is just as apt to increase in cold weather as in hot. This is brought about by the friction of the tire against the road where the traveling is rough. Yet the motorist never thinks of letting out the air in the winter months. A safe rule is to keep the tires inflated to the standard pressure.

SWITCH TIRES AND GAIN MORE MILEAGE.

Much annoyance and many dollars will be saved to motorists who see that cuts and stone bruises are attended to at once. Cuts should be cleaned thoroughly and then filled with tire putty. At the close of the summer and fall season motorists will increase their tire mileage by changing the front tires to the rear and vice versa. In fact it is a good policy to switch tires at certain stated times. For instance, take the left front tire and place it on the right rear wheel, and the right front tire on the left rear wheel. In this manner the wear of the tires is equalized.

HANDY ADDITION TO TOOL BOX.

The wise motorist will keep a tobacco sack full of different sized nuts in his tool box. Small sacks each full of assorted lock washers and cotter pins is another wise precaution. Such articles are sometimes most needed when farthest from the source of supply. A spool of small gauge soft iron wire should be carried in every car. It will be found useful in a dozen different ways.

On Jan. 31 the Cleveland Automobile Co. paid an initial dividend at the rate of eight per cent. on preferred stock.

Proper Care of Top and Upholstery

OWNERS of passenger cars can economize by reasonable care of the upholstery and the tops of their cars.

After a few weeks use even the best mohair material will show off color and if not cared for will require redressing. Some cars are upholstered with Pantasote or Fabrikoid. These materials are imitations of leather and if properly cared for have nearly as good wearing qualities as leather. They have the distinct advantage of not cracking and resist the weather perfectly.

Mohair tops should be frequently dusted and brushed. Pantasote tops and curtains are best cleaned with a soft brush dipped in water to which a little ammonia has been added. A moist cloth is also very good for cleaning dust alone.

Afterwards rub dry. Never attempt to clean a top and curtains with gasoline or kerosene.

Do not fold a top until it has become thoroughly dry, for any moisture remaining in the folds is apt to cause mildew, besides making the top leaky and unsightly with spots. If car is left standing in a garage for some time it is best to have the top open, keeping it stretched and smooth.

Do not use gasoline in cleaning upholstery, either leather or pantasote. Clear water with a little ammonia added will remove the dirt and a brisk rubbing with a clean woolen or flannel cloth will do the rest. For still more careful treatment use a good leather dressing. In cleaning cloth upholstery do not use an acid solution. Cloth is not effected by climatic conditions and will withstand both heat and cold, and not having oil in its make up does not readily retain dirt. In removing dust, beat the cushions and backs lightly with a stick or wire beater. Then remove the dust with a whisk broom or brush.

Grease or oil may be removed by the application of a solution of luke warm water and ivory soap or powdered lux, applied with a woolen cloth. Any of the approved methods for cleaning woolen cloth may be used with success on the upholstery material of the car.

Gasoline and benzine have a tendency to spread instead of remove dirt, and leave a grease stain that gathers dust much quicker after their use.

For making quick and permanent repairs of holes and torn sections in mohair tops, one can buy at automobile supply houses a box of patches. They are sold in various shapes and are ready for use. They sell at nominal prices. These patches are of fine quality of mohair with a coating of uncurling gum on the underside. To use them remove the muslin from the gum side of the patch and moisten with gasoline. Cover the hole or tear with the patch and press firmly until the gum sets. This makes a neat and almost unnoticeable repair.

To Remove Stains from Upholstery.

Peroxide of hydrogen, 20 volumes, diluted one-third with warm water, is recommended for removing stains from Bedford cord upholstery and will not injure the fabric. It is a well known bleaching agent.

LOCATING UNUSUAL NOISES IN ENGINE.

As an aid to locating the cause of unusual noises in automobile engines, it is recommended that the engine be throttled down and the frequency of the occurrence of the noise determined. Generally speaking, common engine noises occur at either camshaft or crankshaft speed. By noting when the knock occurs with reference to the rotation of one or the other of these shafts, it may be more easily classified. In every case main bearings produce knocks at crankshaft speed, as do also crankpin and wristpin defects. Knocks at camshaft speed, which is half that of the crankshaft, are usually due to a loose bearing or to end play of the shaft. If an attempt is made to classify these sounds before proceeding further in the diagnosis, much time and effort can be saved.

NOVELTY IN LICENSE HOLDERS.

One automobile dealer has found that his patrons appreciate a little novelty in the way of a license holder. A small piece of transparent sheeting—the same material of which curtain lights are made—is cut to the desired size. Then a piece of leather substitute is cut a quarter of an inch larger all around so that the edges will lap over the piece of sheeting. These materials are sewed together, leaving the top open, the coated fabric overlapping the sheeting, coated side out. The license slips into the pocket thus formed.

The license is always visible through the transparent sheeting. The leather substitute is durable, water proof and sanitary, and the document is protected from getting torn or soiled, as it is liable to be when carried in the pocket loose.

The dealer can have his card stamped in gold on the back of the holder. It makes a very effective advertisement and is not excessive in cost.

CLEANING GREASE FROM METALS.

It seems a simple matter to wipe oil or grease from unpainted or unlacquered metal surfaces, but those who have tried know that it is not always easy, as the oil does not come off clean.

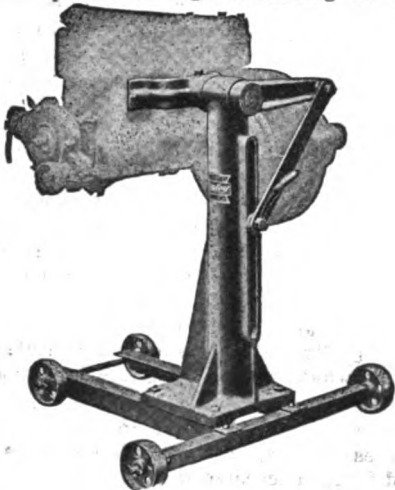
Druggists sell an article known commercially as acid dip that will take off grease and is claimed to leave no streaks, stains or smuts. This is worth trying by those who have to keep polished metal surfaces clean and bright.

SPRING CLIPS.

Tighten the spring clips occasionally. This may prevent a broken spring or the axle shifting out of line and greater safety will be insured, together with less wear on tires.

ACCESSORIES DEPARTMENT

The New Manley Ford Engine Stand includes many new features not heretofore found in engine stands designed for the Ford engine, among them being the adjustable head, which not only takes the Ford engine as a unit, holding it securely by a single bolt fastening, freeing the water jackets from any strain, but is also easily adjustable, allowing the engine to be turned to any position desired. A heavy cast steel base, mounted on an angle iron frame, provided with small rolls, supports the head, at the same time providing an easy means for moving the stand from point to point in the service station. Adjustment of the head is made by an arm fastened to the center shaft, which passes through a bearing in the

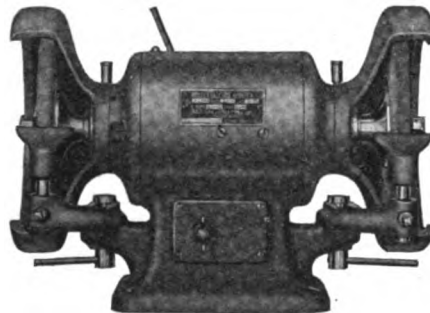


upright of the stand. At the end of this arm a flat steel brace is attached, fitting a bolt which travels in a slot cast in the side of the upright of the standard, and is fastened, after making the necessary adjustment, by a lever, having a treaded opening fitting the bolt.

It is stated that this device makes every part of the Ford engine easily accessible, as the engine is gripped in the center and turns over in a complete circle and may be instantly locked rigidly in any position.

Manufactured by the Manley Manufacturing Co., York, Pa. Price, No. 182 Portable Stand, \$32; No. 181 Stationary Stand, \$28.

Stow-Behch Grinders Nos. S1 and S2 have the motors completely enclosed, with the starting and stopping devices located conveniently in the bases. The grinders may be placed in any convenient place about the service station where current is available. For a few dollars extra a floor stand can be added on which the equipment may be mounted, bringing the work at a standing height from the floor. They may be used as all around grinders for a variety of work, such as buffing, grinding, etc.; can be equipped with extended spindles for the buffers in place of one wheel if desired and may be provided



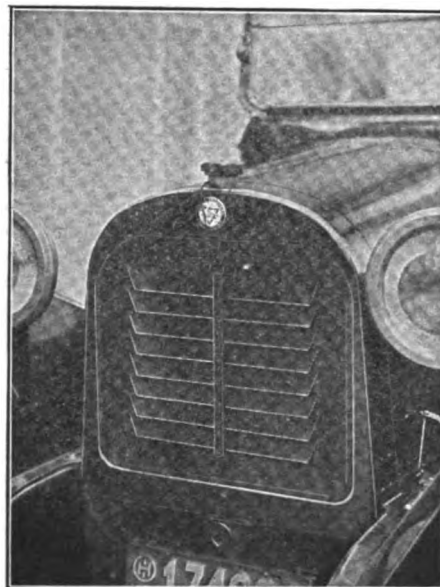
with flanges for clamping wheels to insure their running true, and with a water container of ample dimensions for cooling work while grinding. Hoods for the cutting members are the latest improvement added to these machines, which are provided with hinged doors on the outside.

The motors are wound for either 110 or 220-volt direct current and single two or three-phase alternating current, 60 cycle.

Manufactured by the Stow Manufacturing Co., Inc., Binghamton, N. Y. Prices on request.

The Doty Radiator Shutter is a recent invention that has all the earmarks of a big success. The product is a new shutter for all makes of cars, is made of metal-bound fiber and is so constructed that it can be applied to any car in five minutes, it is stated.

The model for Ford cars is now being turned out in big production units. The company will immediately have several



other models ready for the market, including the Dodge, Chevrolet, Oakland, 1920 Maxwell and new Overland Four cars.

A big feature in favor of the Doty shutter is its very simple construction and the fact that it is claimed to be absolutely free from rattles.

Manufactured by the Auto Radiator Shutter Co., Dayton, O. Price, retail, \$3 each. Special proposition to jobbers and dealers.

The Manley 22-Ton 42-Inch Press is designed and developed especially for automobile repair work in service stations and garages. The frame is made throughout of steel, girder construction being employed wherever possible, giving great



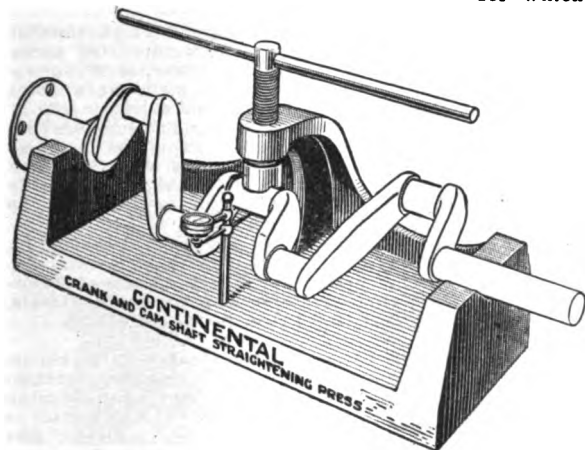
strength. Besides the usual hand wheel, for holding the work in position, additional leverage is supplied by a hand lever and multiplied gearing, operating on the worm of the press and located in the top cross member. The result is a press having a high power ratchet leverage of 2200 to 5000 to one for heavy work. A high speed, high power sensitive leverage of 1000 to one for light work, especially adapted for straightening operations. The 42-inch opening is sufficiently large to easily accommodate a truck wheel with solid tire.

Manley presses may be purchased in larger sizes for heavier work if desired, having a leverage of 44 to one and exerting a pressure of from 3½ to five tons. Extra attachments that are included with the Manley press are two test centers for centering the work, which are indispensable where straightening is to be done, and two 60-degree centers, one fixed, the second adjustable. The Manley press is made throughout of the best of material, by men experienced in this class of machine work and knowing from long experience what the trade demands.

Manufactured by the Manley Manufacturing Co., York, Pa. Price, \$30.

(When Writing to Advertisers, Please Mention the Automobile Journal.)

The Continental Crank and Cam Shaft Straightening Press was designed for service stations catering to the Ford trade. It comprises two tools in one, is light in weight and very accurate in its work.



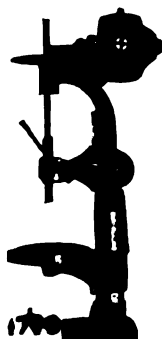
The device consists of a bench rest, made of heavy cast metal, the ends vertical, with V-shaped grooves for the shafts to rest in while straightening and a screw clamp in a vertical bracket, that fits the shafts at its center.

The device is equipped with a dial test indicator reading accurately to a thousandth of an inch.

Ford repairers are aware of the fact that Ford crank and cam shafts are bent very easily and by testing them during the course of repair, guess work on this score is eliminated.

Manufactured by the Continental Auto Parts Co., Knightstown, Ind. Price, \$34 f. o. b.

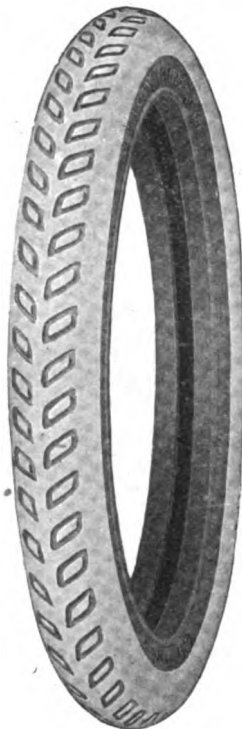
Stow Friction Driven Sensitive Drill is designed for light work requiring rapidity and accuracy and will drill holes up to one-half inch in diameter. The spindle is made of tool steel, is counterbalanced by a spring and provided with a ball thrust bearing. The weight and thrust of the friction disc is also carried on a ball bearing. The table of the drill is counterbalanced by a weight in the column, and can be swung around out of the way when desired. A finished boss is provided on base under the spindle, for convenience in centering long shafts, while an index line is provided on the column for setting ta-



ble central at any height. The friction disc drive permits quick adjustment of the speed, keeping the power in proper proportion to the size of the drill, avoiding drill breakage. The motor is of the simplest construction, having steel magnet cores, form-wound field coils, iron clad armature, tool steel shaft, commutator insulated throughout with mica and provided with self-feeding carbon brushes. The materials entering into the construction of this machine and the workmanship are claimed to be first class in every respect. The drill is complete with V block, cup and point centers.

Manufactured by Stow Manufacturing Co., Inc., Blghampton, N. Y. Prices on request.

Quaker Tires with T. T. T. Tread are the result of many years of careful experimenting on the part of the manufacturer and combine many desirable features. In building Quaker tires mileage is the aim for which the manufacturer strives, and



from the selection of the crude rubber, Sea Island cotton duck and other raw materials used, the employment of highly skilled workmen, to the final process of curing and shipping, this factor is first in mind.

Quaker tires are backed with a guarantee of unlimited mileage and should a defect occur in workmanship or material during any period of the life of the tire, an equitable adjustment will be made regardless of the number of miles the tire has been run.

Quaker tires are made of tempered rubber, an exclusive process controlled by the manufacturer, which gives hardness, toughness, flexibility, elasticity, resiliency and tensile strength, making possible the broad gauge mileage guarantee. T. T. T. is the trade name given to the non-skid tread.

Manufactured by the Quaker City Rubber Co., Philadelphia, Pa. Prices on application.

The Marco Light & Power Plant consists of a single-cylinder, air-cooled gasoline engine mounted on the same base with a Dyneto generator developing 1250 watts, with an overload capacity of 25 per cent.

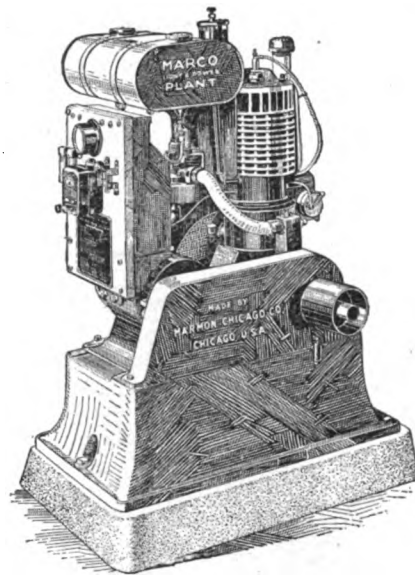
The generator is actuated from the engine crankshaft sprocket by a silent chain, driving the generator at 2000 revolutions per minute, with a slow engine speed of 800 revolutions per minute. The engine is four horsepower, equipped with power pulley, enabling other light farm machinery to be belted to it for power purposes. Ignition is supplied by a Bosch magneto and spark plug of the high-tension type.

The Marco light plant is started by pressing a button, which closes the circuit from the storage batteries to the generator, changing the generator to a motor for starting the gas engine. After the engine picks up the motor automatically changes back to a generator, storing up current in the batteries for future or immediate use.

The outfit is supplied with a suitable panel equipped with switch, fuses, combination volt-ammeter and automatic control, which shuts off the engine when the

batteries are filled or the current is not needed.

The storage batteries are the Prest-O-Lite pasted plate type—16-cell sealed glass jars, that may be placed in any convenient location. Batteries can be fur-



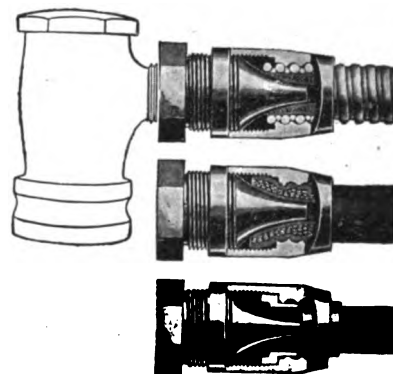
nished in different sizes ranging from 112 to 225 ampere-hour capacity.

The engine alone weighs 235 pounds and it is stated that five minutes work will disconnect it from the base by removing four bolts, when it can then be placed on skids and used for other power purposes.

Distributed by Marco Sales Co., Neenah, Wis. Prices on request.

The Romfort Universal Hose Coupling is designed for the garage or service station supplying air pressure to the trade. The couplings are made and provided with suitable bushings so as to be easily attached to hose of varying size and also metal or armored hose.

Extra bushings are supplied to fit the inside of the coupling, spreading the hose and making an air tight joint. The coupling consists of two sections, a threaded outer section of brass, provided with a hexagon nut, and a tapered inner end, having a hole drilled through the center for the passage of the air. The inner section consists of a metal shell having a smooth opening at the smaller end for the hose to pass through, and the opposite



end threaded for the nipple to screw into, with projections on the interior for the placing of the bushings when applying the coupling to small or armored hose.

It is stated that it is possible to use this coupling on either large or small hose, rubber or metal covered, and on both ends of air hose.

Sold by the Zinke Co., 1323-25 Michigan Avenue, Chicago, Ill. Price, \$1.25.

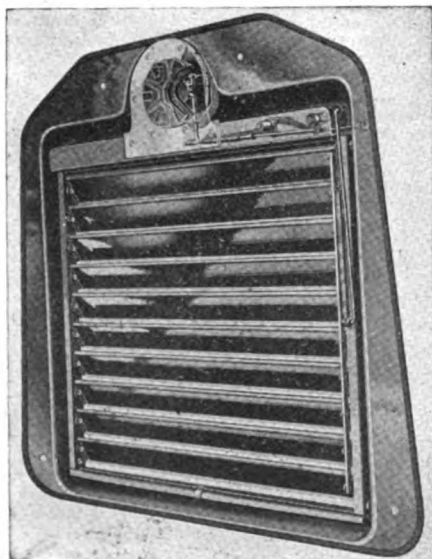
(When Writing to Advertisers, Please Mention the Automobile Journal.)

The "Winterfront" Automatic Regulator is designed for the front of radiators and cooling systems, to protect the cooling medium during cold weather and to facilitate starting the engine under difficult weather conditions. The Winterfront is adapted to all makes of radiators having a flat front, is easily attached by fitting four bolts through the radiator core and tightening them from the inner side of the core. A thermostat is provided at the top, which is entirely enclosed from the elements, is automatic in action and opens and closes the shutters regulated by the temperature of the water in the radiator core. When the car or truck is standing and the water is cool, the shutters auto-



matically close, but as soon as sufficient heat has been generated in the engine water jackets to raise the temperature in the radiator core the shutters automatically open, allowing the cool air to enter and reduce the water to the proper working temperature.

The Winterfront has a drawn steel shell which is made to exactly fit over the core of the radiator. A braided cord edging forms a protecting cushion between the shell of the Winterfront and the core of the radiator. The shutters are made of extra smooth steel and are ribbed, which



makes them rigid. The shutter axles or trunnions are of turned brass working in bearings of a special composition, which insures noiselessness and durability. The shutters are arranged to open in unison and are connected with the thermostat by a rod passing up the side, attached to each shutter. The thermostat consists of a pair

of thermo-wafer cells with a spacer and an aluminum heat conducting flange or plate. The thermo-wafer cells are filled with a mixture of liquid gases proportioned so as to make the cells expand or contract at the desired temperatures. For ordinary requirements they begin expansion at 130 degrees Fahrenheit and are fully expanded at 175 to 180 degrees. Full instructions accompany each Winterfront outfit and it can be easily attached by any mechanic in a few minutes time.

Manufactured by the Pines Manufacturing Co., 408-10 North Sacramento boulevard, Chicago, Ill. Prices and literature on request.

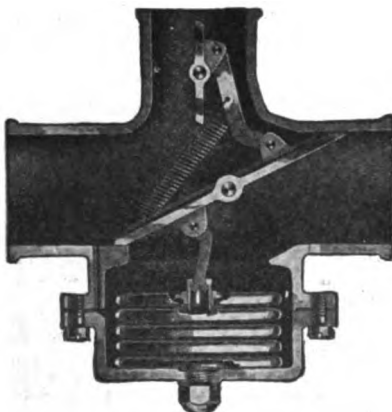
The Rayfield Thermostat was designed for use with internal combustion engines to meet present low grade fuel conditions and is applicable to engines of automo-



biles, trucks or tractors, allowing them to handle low grade fuel to better advantage and greatly facilitating starting and operation in cold weather.

The Rayfield thermostat is made throughout of bronze, obviating corrosion. Its design is such that the main valve will immediately open and permit normal water circulation should the diaphragm ever become punctured.

When the engine starts operating the water in the cooling system is cold and the main valve of the thermostat is closed, which prevent circulation through the engine block. This allows engine temperature to rise to the point of maximum efficiency in a very few minutes, even in the coldest weather. In engines with pump circulation the pump pressure is relieved by by-passing the water from delivery end of the pump through the by-pass



valve and into the radiator. Complete circulation of water through the radiator is thus maintained at all times. This overcomes, to a great extent, the common difficulty of water in the radiator freezing before circulation begins.

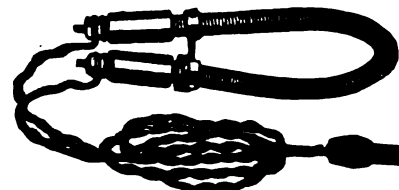
When the water in engine block reaches a temperature of 170 degrees its action upon the diaphragm of the thermostat causes it to expand and gradually to open the main valve and slowly closing the valve of the by-pass connection. The

diaphragm is sensitive to any variation of water temperature and will open or close main valve as required to maintain a constant efficient engine temperature.

The Rayfield thermostat is very easily installed in the top outlet hose connection, between the engine and the radiator, and is normally placed so arrow on thermostat points towards the radiator. On pump circulation engines the lower, or T connection, should always be made at a point between the discharge, or delivery side of the pump and engine, and fittings are furnished for all cars. Provision is also made for the connection of water jacketed carburetors to the thermostat so that the heated water from the engine may be utilized for heating the fuel. Full instructions for attaching to the cooling system accompany each thermostat.

Manufactured by Bencke & Kropf Manufacturing Co., 21st and Rockwell Streets, Chicago, Ill. Price, installed, \$12.50.

The Globe Intake Heater is a simple electrical device that insures prompt starting and perfect engine action during the coldest weather. The intake heater is placed around the intake manifold, just above the carburetor, is furnished with the necessary length of cord and a plug to make connections with the dash socket of the car within easy reach of the operator, is easily attached by anyone in a few moments time and requires a small amount of battery current to operate, as



the heater is only used for from two to five minutes before starting the car, just long enough to thoroughly heat the intake manifold. It is stated that the current consumption of the 6-8 volt heater is only six amperes an hour.

Heaters are shipped, packed in individual boxes 10 to case for jobber and dealer trade. Globe intake heaters are made in voltages for all cars. Specify the voltage of car when ordering, otherwise 6-8 volt heater will be supplied.

Manufactured by the Globe Machine & Stamping Co., 1200-50 West 79th Street, Cleveland, O. Price, \$2.50.

Stow Electrically Driven Portable Drill for alternating or direct current is a portable hand drill for use with alternating current that is stated to be compact, powerful and light. It is claimed that it is possible to use this drill also on direct current. The motor is cooled by a powerful fan, forcing a draft of air over



and under it when running. The armature bearings are ample, of the ball-bearing type, while the spindle is made from high-grade, heat-treated steel, turned and ground. The gears are made from heat-treated nickel steel.

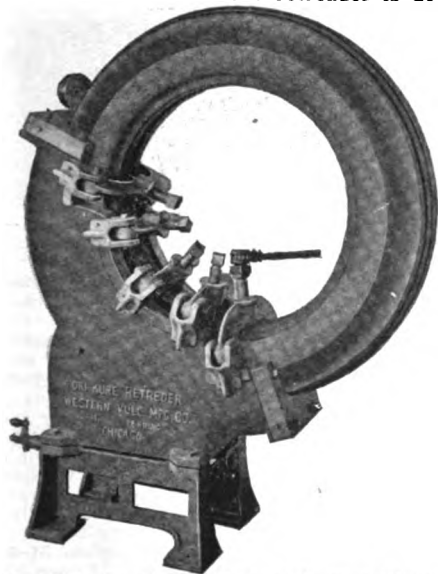
The Stow portable drill is made in three sizes, having three different capacities, as follows: No. S0U, capacity of chuck, 1/4 inch; No. S1U, capacity of chuck, 3/8 inch; No. S2U, capacity of chuck, 1/2 inch.

Manufactured by the Stow Manufacturing Co., Inc., Binghamton, N. Y. Prices and literature on request.

(When Writing to Advertisers, Please Mention the Automobile Journal.)

The Dri-Kure Truck Tire Retreader is designed for repair stations catering to the motor truck trade using the larger sizes of cord pneumatic tires. It is built in an upright position, greatly facilitating the insertion and removal of the tire from the mold. A slight downward pressure rolls the completed job easily out on to the floor.

The Dri-Kure retreader is similar in construction to the size for smaller pneumatic casings and is adapted for all sizes from 36 by 6 inches to 38 by 7 inches. The center portion of the mold is raised, giving a full quarter-circle sectional cavity for sectional work. The retreader is de-

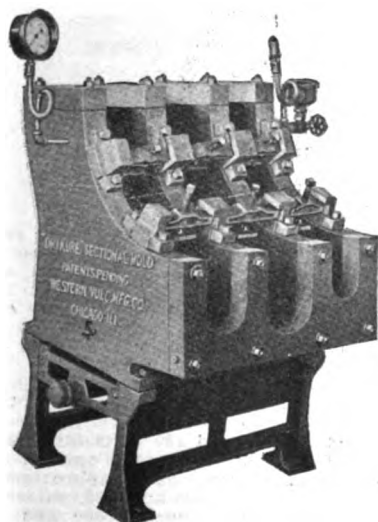


signed to be used either with or without matrices, making it possible to finish tires either with plain, non-skid or rib treads as desired. The steam chest is heated by a gas plate in the base, controlled by a valve just outside. The steam chest ends are provided with wood blocks, which prevent the heat from the steam softening the rubber of the tread beyond the ends of the retreader.

Manufactured by the Western Vulcanizer Manufacturing Co., 150 North Desplaines Street, Chicago, Ill. Prices on request.

The Dri-Kure Sectional Mold is designed and built with the same degree of thoroughness as the Dri-Kure retreader molds, and is equipped with wood block ends, preventing the action of the steam heat from softening the tread beyond the steam chest.

The sectional mold is upright in form and thus eliminates difficulty in removing the tire after the cure is completed. With



a slight downward pull the tire is rolled easily out of the mold on to the floor. All heavy lifting is obviated. In addition to this improvement the Dri-Kure sectional

mold presents a full quarter circle, making possible the curing of a long cord section with an economy of time.

The Dri-Kure sectional mold has three cavities, cast en bloc, and will handle all sizes of tires from three inches to 5½ inches. By the use of shells, the sizes of the units may be changed so that if there is a disproportionate amount of work for any one size, other cavities may also be used for this size.

Manufactured by the Western Vulcanizer Manufacturing Co., 150 North Desplaines Street, Chicago, Ill. Prices and literature on request.

The Noble Floor Type Auto Heater, Style B, is designed for cars of any style or make. The exhaust gases pass from the exhaust pipe through the aluminum piping of the heater and return to the exhaust pipe, thence to the muffler and open air.

The heater is located in an opening cut in the floor of the rear compartment of the car and is made of aluminum, with the exception of the pan underneath, which is galvanized sheet steel. The exhaust gases are conveyed through a length of flexible piping consisting of a tube within a tube. The coupling on the

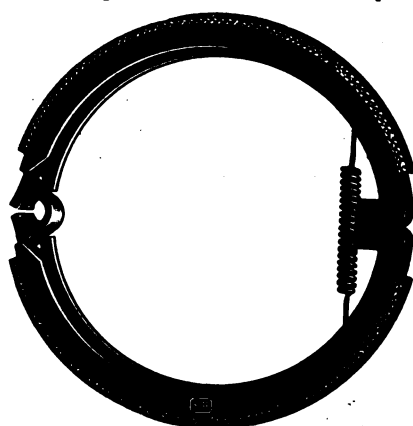


exhaust pipe has a valve regulating the passage of the exhaust gases and is connected by a spring and wire to a ring near the heater.

It is claimed that heat supplied by this appliance costs the operator of the car practically nothing, as waste gases only are utilized. This heater is claimed to be especially adapted to enclosed cars of the sedan, coupe or limousine type, as its heating capacity is unusually large.

Manufactured by the Noble Heater Co., Fort Wayne, Ind. Prices: Style B, Ford special, sizes 8½ by 15 inches, \$30; other cars, style B, regular, \$30; style A, vertical type, regular and Ford special, \$30; style C, regular and Ford special, \$30.

H-S Dependable Emergency Brake Shoe for Ford Cars consists of a replacement brake shoe, made from specially selected channel steel, covered with a very high grade lining. It is stated that the depend-



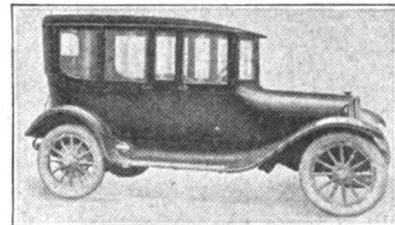
able brake shoe fits perfectly without dragging or binding, supplying the Ford car with a dependable set of emergency brakes.

Manufactured by Hill-Smith Metal Goods Co., 82 Brookline Avenue, Boston, Mass. Price, \$3.50 per pair.

(When Writing to Advertisers, Please Mention the Automobile Journal.)

Anchor Glass Enclosed Tops are designed and built for many popular cars, including Dodge, Overland, Buick and Ford. The tops are stated to be of unusually strong construction throughout, being of selected hard wood stock, reinforced with pressed steel. The rigid deck and frame are carefully covered with a high-grade luster, lasting, water proof material; while the sides, including all windows and door sections, are highly finished wood surfaces.

The windows throughout are of extra heavy clear crystal glass, while all windows and doors are so arranged that the upper or outer pane slides in a felt lined steel channel, and can be raised or lowered as desired. Special fasteners hold the glass in position, overcoming all possibility of rattle or breakage. An electric



dome light is furnished in all tops for interior illumination.

Anchor tops are easily installed, as full instructions accompany each. The regular body irons to which the enclosed top is attached are used as the foundation for Anchor tops. After being lifted into place the tops are held firmly by means of special irons and attachments, which are furnished with each. Each section is plainly marked where to be used and how to be fastened so that when mounted it practically becomes a part of the body itself. It is stated that there are positively no squeaks or rattles.

Manufactured by the Anchor Top & Body Co., Cincinnati, O. Prices and literature on request.

The Walker Triple Gear Jack No. 100 combines great strength, extreme ease of lift and a new way of placing under the axle. It is constructed with a large base and heavy standard well braced with cast ribs, while the working parts, such as machined gears and forged parts, are over size. The gear ratio and 36-inch handle combined give an ease of lift that is phenomenal. Moving parts operate on hardened shafts and ball bearings of the highest grade, while the long handle gives great speed in operation. The triple gear jack is easily placed under the axle with-



out the operator crawling under the car. In operation one hand is placed on the end of the handle and the other hand at the middle, the jack swings in the forked handle socket, gravity holding it in an upright position, and it can be set under the axle without effort, it is stated, and without hitting the gas tank or tire hangers. A double cap provides two heights, making the jack adaptable to high or low axles.

Manufactured by the Walker Manufacturing Co., Racine, Wis. Price, \$10. Weight, 11 pounds.

The Hempy-Cooper Motor Tester should prove very attractive to the garage man who wishes to maintain service of the highest efficiency and realizes what a saving it means in money and time both to himself and patrons to be able to positively diagnose his customer's motor trouble in a few minutes without even running the motor.

In using the Hempy-Cooper tester, all spark plugs are removed and the tester is screwed into spark plug opening. After a complete test of No. 1 cylinder the operation is repeated in each succeeding cylinder until the whole motor has been tested. All tests on each cylinder are made without changing the position of the tester. The different methods of procedure to test compression, piston rings, valves, piston slap, wrist pins, connecting rods and main bearings are all very simple.

For example, to test for piston slap: Turn the motor 30 degrees past top center so that connecting rod will be at an angle, then work plunger up and down with a short stroke; if the piston is loose you will hear a clattering noise as the piston moves from one wall to the other. However, if the trouble is not a piston slap it is a matter of only a few minutes before one of the other equally easy tests locates the trouble positively.

The test for compression loss serves as an illustration of the simplicity with which the different tests are made. Push



the tester handle down and fasten hook in opening. Turn the motor two complete revolutions by hand. The gauge will indicate the number of pounds compression in cylinder.

Or in case of the valve test, turn the motor until piston is up with the valves closed. Push tester handle down and a leaky intake valve will blow compression out through carburetor or through intake manifold to the cylinder that is on suction stroke, and then out through spark plug opening. Leaky exhaust valve compression will blow out through muffler or through the spark plug hole in the cylinder that is on exhaust stroke.

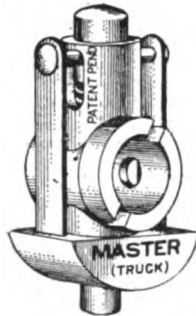
The tester is simple in the extreme, consisting mainly of an ordinary plunger pump with a hollow plunger to allow the compression to register on the attached gauge. An instrument with so few movable parts is practically immune to wear and should prove very durable.

Distributed by the Fairbanks Co., New York City. Price complete, \$18, including fittings for 1/2-inch standard, 3/4-inch S. A. E. and metric threads.

The "Master" Governor for Ford Trucks was designed for commercially used Ford cars and trucks and tractors, insuring positive, unfailing control of Ford engine speed without impairing or altering the engine's efficiency.

The governor consists of a specially constructed timer brush of the wipe contact type, fastened to the camshaft in the regular manner, but has, in addition, a

weight attached by two side straps to a cross pin in the brush contact and a guide fitting the hub of the brush carrier and the camshaft. When the speed of the engine reaches 1400 turns a minute the brush contact is broken by the weight



drawing the brush away from the contacts of the timer case and cutting out the ignition of the engine; when the speed of the engine falls back to normal the weight allows the contact brush to re-make the contact with the points of the case, due to spring action within the brush carrier and the engine speed again picks up.

It is stated that drivers cannot tamper with this governor, alter it, or effect a change in its operation. At 1400 revolutions a minute the Ford engine develops its rated horsepower (20-22 1/2).

Manufactured by the Master Products Co., Detroit, Mich. Price, \$5.

Rie Nie Fabric Back Patch is as its name implies a patch for repairing punctures in automobile tubes and other articles of rubber, reinforced by a fabric backing that greatly strengthens the final patch and makes a more perfect job.

The manufacturer states that Rie Nie patches will not leak and resist high air pressure, the fabric backing insuring strength and durability. The patch is applied without the use of heat and as the



work of applying the patch is done entirely with the hands, tools are unnecessary. Rie Nie patches are equally effective in repairing rubber goods of all kinds and is said to make a permanent, lasting repair that is not affected by heat or cold and is nearly equal to work done by the vulcanizing process.

Manufactured by the Durkee-Atwood Co., Minneapolis, Cleveland and Detroit. Prices on application.

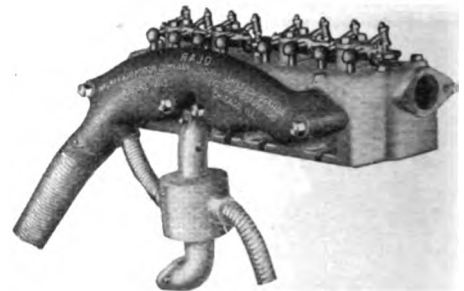
The "Rajo" Model 30 Valve-in-Head for Ford Cars is a replacement proposition by which the Ford engine can be converted into an overhead valve type of engine without great expense. The device consists of a special separable head fitted



with overhead valves, operated by long push rods passing through the regular guides to the tappets of the engine. Special manifolds for the intake and exhaust are provided and a heating device for the

inlet manifold, connected to the exhaust manifold by flexible tubing. The separable head is cast in one piece of highest grade cylinder iron, while the exhaust manifold is constructed with a by-pass and pipe that carries hot fumes to a jacket surrounding the intake manifold and heating the gas before it reaches the combustion chambers of the engine.

It is stated by the manufacturer that the Rajo valve-in-head assures complete combustion, reduces carbon accumulation to a minimum, increases the mileage per gallon of gasoline to an average between

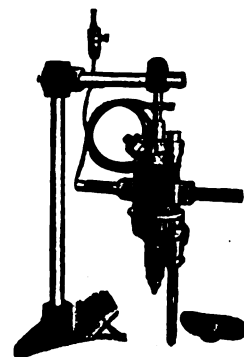


25 and 30 miles, at the same time allowing quicker acceleration and better power on hills.

The Rajo model 30 is fully guaranteed by the manufacturer against defects and workmanship for a period of one year from date of purchase. Fifteen days trial is allowed and if not satisfactory the purchase price will be refunded. The Rajo cooling system provides for ample water circulation around all combustion chambers and valves, eliminating all possibility of overheating. Special heads for Ford racing models are also supplied.

Sold by Trindl Sales Corporation, 57-61 East 24th Street, Chicago, Ill. Prices on request.

Stow Heavy Duty Two-Spindle Drill is designed for heavy work in and about the service station. By means of the two spindles, drills from 1/16-inch to 1/2-inch can be easily used and a greater drilling efficiency secured. The drill is fitted with a heavy duty type motor, having extra heavy bearings, enclosed in a grease tight case with all gears running in a bath of lubricant. All gears are made from specially heat-treated steel, which guarantees long life. The No. 1 or center spindle is fitted with a Jacobs chuck taking S. S. drills 0 to 1/2 inch at a speed of 450 revo-



lutions a minute. No. 2, or the offset spindle, is fitted with a Morse taper socket and takes M. T. drills up to one inch, at a speed of 225 revolutions a minute. This tool is adapted to small shops where only one tool of this kind is desired. It is capable of drilling hard wood up to 1 1/4 inches and metal up to one inch.

The capacity of the No. 1 Jacobs chuck is 1/2 inch, Morse taper socket, No. 2 taking drills up to 29/32 inch. The motor is wound for 110 and 220 volts direct current or 60 cycles alternating current and Universal as desired. Speed approximately, direct current, 450 and 225, alternating current and Universal, 500 and 250 revolutions per minute.

Manufactured by Stow Manufacturing Co., Inc., Binghamton, N. Y. Prices on request.

(When Writing to Advertisers, Please Mention the Automobile Journal.)

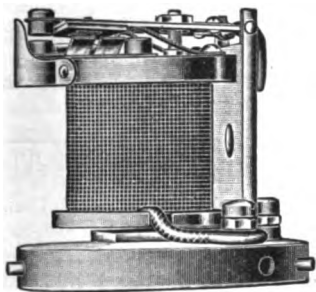
The King Priming Device for Ford Cars consists of two priming cups, threaded and inserted in $\frac{1}{4}$ -inch openings in the elbows of the intake manifold. A tube extends from the end of the petcock into the intake manifold, conducting the gasoline into the valve chamber of the engine, allowing the engine to be started more quickly than is ordinarily possible. The cups can be inverted after the engine has



been primed, shutting the valves and preventing the entrance of dust and dirt into the cups. The priming cocks are made of brass, either polished or nickel plated.

Manufactured by W. C. King, 911 Sargent Street, Litchfield, Ill. Prices on request.

Reverse Current Cut-Out for Automobile Lighting Plants is a device which is designed to automatically close the charging



ing circuit, throwing the battery into the line, when the generator pressure has reached a specified voltage, generally one volt higher than the normal battery voltage; secondly, to automatically break the charging circuit, throwing the battery out of the line when the generator pressure has dropped to normal battery voltage, thus allowing a flow of current into the battery from the generator at such times as the generator voltage exceeds the bat-

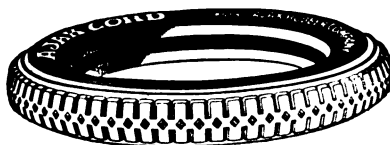


tery voltage, and preventing at all times a flow of current from the battery through the generator.

These instruments are furnished to work on voltages ranging between six and 32 and are made in one style known as type 2000, with a removable steel cover.

Manufactured by Briggs & Stratton Co., Milwaukee, Wis. Prices in quantity lots on application.

Ajax Cleated Tread Cord Tires are the result of many successful years of manufacturing and experimenting by the manufacturer in the making of fabric tires.



They embody great strength in the carcass, which is made of Sea Island cotton, covered with layer after layer of cotton cords, impregnated with rubber criss-crossed, to give strength, and are covered by a special tread having longitudinal

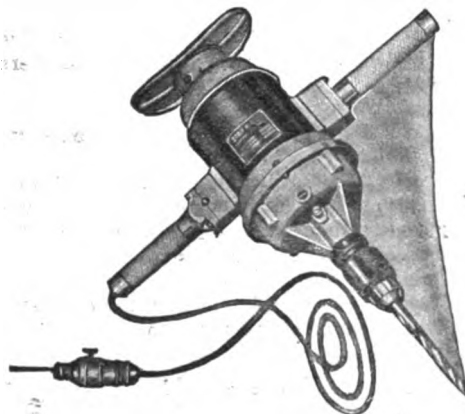


strips and cross cleats. This form of tread is peculiar to Ajax cord tires and is claimed to increase the traction, adding to its strength and increasing its wear-resisting qualities.

Manufactured by the Ajax Rubber Co., Inc., 218-222 W. 57th Street, New York. Prices on request.

Stow Heavy Drills are designed especially to withstand severe service in garage and service stations. The motor armature is mounted in heavy duty bronze bearings with a ball thrust bearing on the end of the spindle to take care of the end thrust. Specially treated steel gears connect the motor to the drill spindle. All gears are encased in a grease filled housing, insuring long life and low upkeep.

All parts of the drill are perfectly balanced, it is stated, making the drill especially easy to handle. The gearing is of the planetary type and is well adapted to this class of work. With this system of gearing power is transmitted equally from opposite points on each gear, so that wear is reduced to a minimum. The chuck



is of the well known Jacobs make, easily operated, holding the drills firm, yet is easily opened when changing drills.

It is stated that this tool will drill hard wood up to $\frac{1}{4}$ inch and metal up to $\frac{1}{8}$ inch, while the capacity of the chuck is $\frac{1}{2}$ inch. Speed is approximately 500 revolutions a minute, while the maximum horsepower given by the motor is one-fourth. The motor is wound for 110 or 220 volts direct current or 60-cycle alternating current and Universal as desired.

Manufactured by the Stow Manufacturing Co., Inc., Binghamton, N. Y. Prices on request.

The Rose Auto Grease Gun is adapted for light oils and some grades of hard grease, but is easily filled with hard grease by removing the nozzle on the end. The grease gun measures $1\frac{1}{4}$ inches outside diameter and $12\frac{1}{2}$ inches over all. It



is stated that using either the curved or tapered nozzle, it is possible to pack a universal joint completely full of grease without waste. Weight, $1\frac{1}{4}$ pounds.

Manufactured by J. H. Haney & Co., Hastings, Neb. Price, \$1.80.

The Globe Hand Warmers consist of two electrical heating pads attached to the steering wheel by screws. The heaters



are connected to the electrical system of the car by two wires and a plug, fitting a socket on the dash, or they may be fitted to a socket located at any convenient point handy to the operator. The hand warmers are easily applied by anyone in a few minutes time, are nickel plated and highly polished and are attractive looking on the steering wheel. The inside of the warmers are lined with green baize cloth to prevent the steering wheel from becoming scratched or marred. The Globe hand warmers consume very little current. It is stated that the 6-8 volt type consumes only three amperes an hour when in continuous use.

Packed in individual boxes, 10 boxes to the case, for jobbers and dealers. In ordering specify the voltage of car, otherwise 6-8 volt type will be supplied.

Manufactured by the Globe Machine & Stamping Co., 1200-50 West 76th Street, Cleveland, O. Price, \$3.50 a pair.

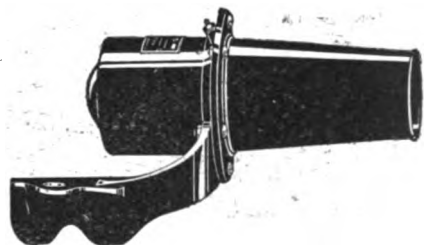
"Red Devil" No. 80 Automobile Tire Iron and Jack Handle is especially designed for quick handling of tires, is light in weight and constructed from forged steel. The tire iron and jack handle has a



smooth finish so that no harm can come to a tire on which it is used. May also be used as a jack handle or for other purposes where a leverage is desired. Made in $\frac{3}{4}$ inch steel, 12 inches long and 16 inches long.

Manufactured by Smith & Hemenway Co., Inc., 130 Colt Street, Irvington, N. J. Prices on request.

The Klaxon No. 5 Motor Driven Horn for Ford Cars is designed for cars factory equipped with self starters and electric lights. The horn is easily attached to the original horn bracket and is finished in black enamel. Full instructions accom-



pany each motor driven horn, so that its attaching to the car is easily done.

Manufactured by the Klaxon Co., Newark, N. J. Price on request.

(When Writing to Advertisers, Please Mention the Automobile Journal.)

Cadillac's Modern Plant Consists of Eight Separate Units

Engineers describe the new plant now being erected for the Cadillac Motor Car Co. in Detroit as the "most modern automobile factory in the world." From the standpoint of railroad facilities the site could hardly be surpassed, as it comprises 46 acres, with the main line of the Michigan Central railroad on one side and the freight tracks of the Lake Shore and Michigan Southern on the other.

The buildings of this new plant will contain 2,100,000 square feet, or 48 acres, of floor space. They will all be four stories in height, but are to be so designed that two additional floors can be added at any time. To the eye all the buildings will be seen as a harmonious combination of exposed concrete columns, horizontal bands and red brick walls forming the vast areas of steel sash.

Of the eight buildings comprising the factory, the largest is the manufacturing building, 800 feet long and 600 feet wide, with a total floor space of 1,750,000 square feet when it is carried to its ultimate height of six stories. The courts between the wings will be covered with glass roofs at the height of the first floor ceiling. This will give an area on the first floor 800 feet long and 600 feet wide, or 480,000 square feet.

Conveniently located near the manufacturing building will be the heat treat building, 500 feet long and 80 feet wide.

The assembly building will be the second largest building in the plant, 800 feet long and 360 feet wide, with a total floor area of 620,000 square feet. As in the manufacturing building, the court will be covered with a glass roof, giving an unbroken area on the ground floor of 188,000 square feet. A considerable portion of the assembly building will be devoted to painting operations on chassis, wheels, bodies and metal parts. The body will be upholstered and trimmed in this building, which will also contain the enameling equipment.

The storage building for finished cars and service stock parts, adjoining the assembly building, will be 480 feet long and 140 feet wide. Directly adjoining the storage building will be the "loading dock" with trackage for the placing at one time of 50 railroad cars.

In the administration building, 225 feet long and 50 feet wide, will be located the executive offices.

From the power plant fronting on Clark avenue will be delivered steam, electricity, compressed air, water and the heat required for the operation of

the factory. Near the power plant will be located the oil store house with a modern and complete system for the receipt, storage and delivery of the many kinds of oil required throughout the factory. A separate building is also being provided to collect all of the scrap iron, aluminum and brass, and all other materials to be salvaged.

In one wing of the assembly building will be located a welfare department, with first aid rooms, in which doctors and nurses will be in attendance during all working hours. In general, every provision is being made for the comfort and safety of the Cadillac workmen.

RAINIER DISTRIBUTOR FOR 22 TEXAS COUNTIES.

The Nash & Hurley Motor Co., distributor in 22 counties of the Rainier truck, made by the Rainier Motor Corporation, Flushing, N. Y., is to open an office and warehouse at Fort Worth, Tex., where the three-quarters, one, 1½ and two-ton models, as well as a complete line of truck supplies, will be handled.

The president of the Nash & Hurley company is George B. Nash of Fort Worth, and the secretary-treasurer is George A. Hurley, formerly of Cleveland, O.

CHAPMAN IS PACKARD ADVERTISING EXPERT.

The Packard Motor Co., Detroit, has appointed William Carl Chapman, who was its expert advertising manager, and stationed him at the main office at Detroit. Mr. Chapman attracted attention by his cleverness in varying forms of publicity while he was assistant advertising manager for the Packard Motor Car Co. of New York.

LOUISIANA-MISSISSIPPI ASSOCIATION.

The Louisiana-Mississippi Automotive Trade association, whose headquarters are at 712 Poydra street, New Orleans, La., has inaugurated an "each-member-get-a-member" campaign to increase its membership 100 per cent. before the Lake Charles convention, March 17 and 18. This association is also soon to publish a list of every car and truck dealer in Louisiana and Mississippi.

The total number of licensed chauffeurs in Michigan is 43,285.

WHAT THE CAR HAS DONE.

By W. C. Silla.

General Manager of Sales, Chevrolet Motor Co.

Created wealth by increasing land values.

Brought the farmer closer to his markets, making farming a more profitable and pleasant occupation.

Enabled the physician to save time in reaching his patients and save lives in many instances.

Increased the personal efficiency of all business men who have availed themselves of its time and labor saving advantages.

Aided the salesman to cover more territory in less time—to do his work better, quicker and at less expense.

Furnished a means of healthful recreation for all.

Stimulated the building of thousands of miles of better highways, bringing commercial prosperity to hundreds of cities and towns formerly handicapped because of their inaccessibility.

Enabled those in rural communities to enjoy all the advantages of the city and those in the cities all the pleasures of the country.

Increased the economic wealth of the country by creating a new industry which now ranks third among the great industries of the country.

Stimulated greater sociability among farmers and encouraging them to modernize both their methods and their homes.

Demonstrated the economy and superiority of motor transportation for all commercial uses.

HEAT INCREASE OF PRESSURE IN TIRE SMALL.

Frequent observations conducted by tire experts have demonstrated that the vast majority of motorists keep their tires under-inflated. This is really the "white plague" of the pneumatic tire. It loosens the tread from the fabric, giving it a rough, wavy appearance, that soon renders it unfit for use.

In order that the correct amount of air in tires may be readily ascertained, a standard table for all makes of tires is shown, as follows:

Inflation		Inflation	
Rim Sizes	Pounds	Rim Sizes	Pounds
28x3	60	33x4½	70
30x3	60	34x4½	70
29x3½	60	35x4½	70
30x3½	60	36x4½	70
31x3½	60	37x4½	70
32x3½	60	38x4½	70
33x3½	60	40x4½	70
34x3½	60	42x4½	70
36x3½	60	33x5	80
32x3	70	34x5	80
34x3	70	35x5	80
30x4	70	36x5	80
31x4	70	37x5	80
32x4	70	39x5	80
33x4	70	41x5	80
34x4	70	43x5	80
35x4	70	36x5½	80
36x4	70	37x5½	80
37x4	70	38x5½	80
40x4	70	39x6	85
42x4½	70		

NATIONAL BANK SAVINGS.

The national banks of the country earned approximately \$1,000,000,000 during 1919, according to a report made by the comptroller of currency.



New Modern Factory of the Cadillac Motor Car Co., Detroit, Mich.

Official Roster National Automobile Chamber of Commerce

THE National Automobile Chamber of Commerce, Inc., has just issued a complete roster of its officers, committees and membership, including also the objects of the organization. These are stated as follows:

To foster the interests of those engaged in the trade or business of manufacturing automobiles and all other self-propelling vehicles; to reform abuses relative thereto; to secure freedom of its members from unjust or unlawful exactions; to diffuse accurate and reliable information as to the standing of merchants and others dealing with members, as to all inventions, patents, processes or devices designed or intended for use in, upon, or in connection with such vehicles and the manufacture thereof, as to the state of the art relative thereto, and as to the condition and development of the trade in which the members are engaged, in the United States and foreign countries; to procure uniformity and certainty in the customs and usages of such trade; to promote the construction of better highways; to advocate the enactment of just and equitable laws affecting members; to settle differences between members; to promote a more enlarged and friendly intercourse among business men engaged in such trade or dealing with persons engaged therein; to acquire by grant, gift, purchase, devise or bequest, to hold and to dispose of such property as the purposes of the corporation shall require, subject to such limitations as may be prescribed by law, including inventions, letters patent and processes, or rights thereunder, for the benefit of its members and not for pecuniary profit.

The offices of the association are given as follows: 7 East 42nd street, New York; Riggs building, Washington, D. C.; Ford building, Detroit, Mich.

Officers and Committees.

The officers, committees, etc., are as follows:

President, Charles Clifton, Pierce-Arrow Motor Car Co.; **first vice president,** Hugh Chalmers, Chalmers Motor Co.; **second vice president,** passenger car division, R. D. Chapin, Hudson Motor Car Co.; **second vice president,** motor truck division, Windsor T. White, White Motor Co.; **secretary,** C. C. Hanch, Maxwell Motor Co., Inc.; **treasurer,** H. H. Rice, Chevrolet Motor Co.

Board of Directors—A. J. Brosseau, Mack Brothers Motor Car Co.; Hugh Chalmers, Chalmers Motor Co.; R. D. Chapin, Hudson Motor Car Co.; C. W. Churchill, Winton Co.; Charles Clifton, Pierce-Arrow Motor Car Co.; R. H. Collins, Cadillac Motor Car Co.; John F. Dodge, Dodge Brothers; J. Walter Drake, Hupp Motor Car Corporation; C. C. Hanch, Maxwell Motor Co.; Alvan Macauley, Packard Motor Car Co.; William E. Metzger, Columbia Motors Co.; R. E. Olds, Reo Motor Car Co.; H. H. Rice, Chevrolet Motor Co.; Windsor T. White, White Motor Co.; John N. Willys, Willys-Overland Co.

General manager, Alfred Reeves; **assistant general manager,** J. S. Marvin; **show manager,** S. A. Miles.

Committees.

Legislative—Chairman, H. H. Rice,

Chevrolet; **secretary,** Harry Melxell, Jr., N. A. A. C.; D. C. Fenner, Mack; J. I. Farley, Auburn; David S. Ludlum, Autocar; F. I. Barrows, Lexington.

Patents—Chairman, C. C. Hanch, Maxwell; **manager,** R. A. Brannigan, N. A. A. C.; Windsor T. White, White; C. W. Churchill, Winton; Wilfred C. Leland, Lincoln; William MacGlashan, Studebaker.

Traffic—Chairman, William E. Metzger, Columbia; **manager,** J. S. Marvin, N. A. A. C.; A. I. Philp, Dodge Brothers; F. C. Chandler, Chandler; William L. Day, G. M. C.; George Dickson, National.

Passenger Car Shows—Chairman, John N. Willys, Willys-Overland; **manager,** S. A. Miles, N. A. A. C.; H. G. Root, Westcott; Harry M. Jewett, Paige.

Motor Truck Shows—Chairman, M. L. Pulcher, Federal; **manager,** S. A. Miles, N. A. A. C.; A. J. Whipple, Diamond T.; David S. Ludlum, Autocar.

Highways—Chairman, Roy D. Chapin, Hudson; **secretary,** Pyke Johnson, N. A. A. C.; William E. Metzger, Columbia; Royal R. Scott, Willys-Overland; S. M. Williams, Garford; George M. Graham, Pierce-Arrow.

Electric Vehicle—Chairman, W. C. Anderson, Detroit; Fred R. White, Baker; H. W. Suydam, Milburn.

Membership—Chairman, C. W. Churchill, Winton; J. Walter Drake, Hupp; A. J. Brosseau, Mack.

Insurance—Chairman, William E. Metzger, Columbia; E. T. Strong, Buick; George E. Goddard, Dodge Brothers; Milton Tibbetts, Packard; F. L. Jewett, Paige; E. A. Williams, Jr., Garford; M. L. Pulcher, Federal.

Foreign Trade—Chairman, J. Walter Drake, Hupp; **secretary,** H. R. Cobleigh, N. A. A. C.; P. S. Steenstrup, General Motors; H. M. Robins, Dodge Brothers, Jay Rathbun, White; E. C. Morse, Willys-Overland; J. P. Roberts, Studebaker, H. B. Phipps, Hudson.

Conservative—Chairman, W. C. Sills, Chevrolet; T. R. Lippard, Stewart; M. Cook, Service; F. E. Bradfield, Velie; C. A. Baird, Cunningham.

Motor Truck—Chairman, Windsor T. White, White; **secretary,** F. W. Fenn, N. A. A. C.; Ray C. Chamberlin, Packard; George M. Graham, Pierce-Arrow; Victor L. Brown, Sterling; M. L. Pulcher, Federal; R. H. Salmons, Selden; D. C. Fenner, Mack.

Rural Motor Express—Chairman, James L. Geddes, Kelly-Springfield; E. A. Williams, Jr., Garfield; O. H. Browning, International Harvester; A. T. Murray, Bethlehem; George D. Wilcox, Commerce.

Hand Book—Chairman, E. T. Strong, Buick; F. H. Akers, Reo; George A. Kissel, Kissel; Garvin Denby, Denby.

Service—Chairman, E. T. Herbig, Service; H. W. Drew, Packard; W. M. Ladd, Pierce-Arrow; A. B. Cumner, Autocar; W. M. Britton, Republic; C. T. Hillshafer, Chandler; W. B. Riley, Jordan.

Truck Standards—Chairman, D. C. Fenner, Mack; Francis W. Davis, Pierce-Arrow; F. A. Whitten, G. M. C.; E. M. Sternberg, Sterling; F. F. Beall, Packard.

Passenger Car Standards—Chairman, Howard C. Marmon, Marmon; N. E. Wahlberg, Nash; Ralph Davis, Mitchell; George B. Allen, Liberty; L. C. Freeman, Maxwell.

Motor Fuel—Chairman, John N. Willys, Willys-Overland; Alvan Macauley, Packard; C. W. Nash, Nash; John F. Dodge, Dodge Brothers; E. A. Williams, Jr., Garford.

Representing Automotive Industry in Conference with Representatives of Oil Industry—Chairman, John N. Willys, Willys-Overland; Alvan Macauley, Packard; C. W. Nash, Nash; H. L. Horning, representing Motor & Accessory Manufacturers' association; C. F. Kettering, representing Society of Automotive Engineers. **Representatives on National Industrial**

Conference Board—Charles Clifton, Pierce-Arrow; A. J. Brosseau, Mack.

National Councillors to Chamber of Commerce, U. S. A.—Charles Clifton, Pierce-Arrow, Buffalo, N. Y.; R. H. Johnston, White, Washington, D. C.

Membership.

The present membership in the National Automobile Chamber of Commerce includes 86 makers of passenger cars and 61 motor truck manufacturers. The complete list, with the trade name of the car and address, is as follows:

Passenger Car Manufacturers.

Allen, Allen Motor Co., Columbus, O.; Anderson, Anderson Motor Co., Rock Hill, S. C.; Apperson, Apperson Brothers Automobile Co., Kokomo, Ind.; Auburn, Auburn Automobile Co., Auburn, Ind.

Baker, Baker R & L Co., Cleveland, O.; Brewster, Brewster & Co., Long Island City, N. Y.; Briscoe, Briscoe Motor Corporation, Jackson, Mich.; Buick, Buick Motor Co., Flint, Mich.

Cadillac, Cadillac Motor Car Co., Detroit, Mich.; Case, J. I. Case Threshing Machine Co., Racine, Wis.; Chalmers, Chalmers Motor Co., Detroit, Mich.; Chandler, Chandler Motor Car Co., Cleveland, O.; Chevrolet, Chevrolet Motor Co., New York, N. Y.; Cleveland, Cleveland Automobile Co., Cleveland, O.; Cole, Cole Motor Car Co., Indianapolis, Ind.; Columbia, Columbia Motors Co., Detroit, Mich.; Commonwealth, Commonwealth Motors Co., Chicago, Ill.; Crow-Elkhart, Crow-Elkhart Motor Co., Elkhart, Ind.; Cunningham, James Cunningham Son & Co., Rochester, N. Y.

Daniels, Daniels Motor Car Co., Reading, Pa.; Davis, George W. Davis Motor Car Co., Richmond, Ind.; Detroit Electric, Detroit Electric Car Co., Detroit, Mich.; Dodge Brothers, Dodge Brothers, Detroit, Mich.; Dorris, Dorris Motor Car Co., St. Louis, Mo.; Dort, Dort Motor Car Co., Flint, Mich.

Elcar, Elkhart Carriage & Motor Car Co., Elkhart, Ind.; Elgin, Elgin Motor Car Corporation, Chicago, Ill.

Fiat, F. I. A. T., New York, N. Y.; Franklin, H. H. Franklin Manufacturing Co., Syracuse, N. Y.

Glide, Bartholomew Co., Peoria, Ill.; Grant, Grant Motor Car Corporation, Cleveland, O.

Haynes, Haynes Automobile Co., Kokomo, Ind.; Hollier, Lewis Spring & Axle Co., Chelsea, Mich.; Holmes, Holmes Automobile Co., Canton, O.; Hudson, Hudson Motor Car Co., Detroit, Mich.; Hupmobile, Hupp Motor Car Corporation, Detroit, Mich.

Jackson, Jackson Motors Corporation, Jackson, Mich.; Jones, Jones Motor Car Co., Wichita, Kan.; Jordan, Jordan Motor Car Co., Cleveland, O.

King, King Motor Car Co., Detroit, Mich.; Kissel Kar, Kissel Motor Car Co., Hartford, Wis.; Kline Kar, Kline Car Corporation, Richmond, Va.

Lexington, Lexington Motor Co., Connersville, Ind.; Liberty, Liberty Motor Car Co., Detroit, Mich.; Lincoln, Lincoln Motor Co., Detroit, Mich.; Locomobile, Locomobile Co. of America, Bridgeport, Conn.; Lorraine, Lorraine Motors Corporation, Grand Rapids, Mich.

McFarlan, McFarlan Motor Co., Connersville, Ind.; Maibohm, Maibohm Motors Co., Sandusky, O.; Marmon, Nurdyke & Marmon Co., Indianapolis, Ind.; Maxwell, Maxwell Motor Co., Detroit, Mich.; Mercer, Mercer Motors Co., Trenton, N. J.; Milburn Electric, Milburn Wagon Co., Toledo, O.; Mitchell, Mitchell Motors Co., Racine, Wis.; Monroe, William Small Co., Indianapolis, Ind.; Moon, Moon Motor Car Co., St. Louis, Mo.

Nash, Nash Motors Co., Kenosha, Wis.; National, National Motor Car & Vehicle Corporation, Indianapolis, Ind.

Oakland, Oakland Motor Car Co., Pontiac, Mich.; Oldsmobile, Olds Motor Works, Lansing, Mich.; Overland, Willys-Overland Co., Toledo, O.; Owen Magnetic, Baker R & L Co., Cleveland, O.

Packard, Packard Motor Car Co., Detroit, Mich.; Paige, Paige-Detroit Car Co., Detroit, Mich.; Paterson, W. A. Paterson Co., Flint, Mich.; Peerless, Peerless Motor Car Co., Cleveland, O.; Pierce-Arrow, Pierce-Arrow Motor Car Co., Buffalo, N. Y.; Pilot, Pilot Motor Car Co., Richmond, Ind.; Premier, Premier Motor Corporation, Indianapolis, Ind.

Raulang, Baker R & L Co., Cleveland, O.; Reo, Reo Motor Car Co., Lansing, Mich.; Roamer, Barley Motor Car Co., Kalamazoo, Mich.; R & V Knight, Root & Van Dervoort Engine Co., East Moline, Ill.

Saxon, Saxon Motor Car Corporation, Detroit, Mich.; Sayers, Sayers & Scovill Co., Cincinnati, O.; Scripps-Booth, Scripps-Booth Corporation, Detroit, Mich.; Standard, Standard Steel Car Co., Pittsburgh, Pa.; Stearns-Knight, F. B. Stearns Co., Cleveland, O.; Stephens, Moline Plow Co., Stephens Motor Branch, Moline, Ill.; Studebaker, Studebaker Corporation, South Bend, Ind.; Stutz, Stutz Motor Car Co., Indianapolis, Ind.

Templar, Templar Motors Corporation, Cleveland, O.

Velle, Velle Motors Corporation, Moline, Ill.

Westcott, Westcott Motor Car Co., Springfield, O.; Willys-Knight, Willys-Overland Co., Toledo, O.; Winton, Winton Co., Cleveland, O.

Motor Truck Manufacturers.

Acme, Acme Motor Truck Co., Cadillac, Mich.; American La France, American La France Fire Engine Co., Elmira, N. Y.; Atterbury, Atterbury Motor Car Co., Buffalo, N. Y.; Autocar, Autocar Co., Ardmore, Pa.

Bethlehem, Bethlehem Motors Corporation, Allentown, Pa.; Briscoe, Briscoe Motor Corporation, Jackson, Mich.; Brockway, Brockway Motor Truck Co., Cortland, N. Y.; Buick, Buick Motor Co., Flint, Mich.

Chevrolet, Chevrolet Motor Co., New York, N. Y.; Clydesdale, Clydesdale Motor Truck Co., Clyde, O.; Commerce, Commerce Motor Car Co., Detroit, Mich.; Corbitt, Corbitt Motor Truck Co., Henderson, N. C.; Cunningham, James Cunningham Son & Co., Rochester, N. Y.

Denby, Denby Motor Truck Co., Detroit, Mich.; Diamond T, Diamond T Motor Car Co., Chicago, Ill.; Dodge Brothers, Dodge Brothers, Detroit, Mich.; Dorris, Dorris Motor Car Co., St. Louis, Mo.; Duplex, Duplex Truck Co., Lansing, Mich.

Federal, Federal Motor Truck Co., Detroit, Mich.

Garford, Garford Motor Truck Co., Lima, O.; G. M. C., General Motors Truck Co., Pontiac, Mich.; Graham, Graham Brothers, Evansville, Ind.; Grant, Grant Motor Car Corporation, Cleveland, O.

International, International Harvester Co., Chicago, Ill.

Jackson, Jackson Motors Corporation, Jackson, Mich.; Jones, Jones Motor Car Co., Wichita, Kan.

Kelly-Springfield, Kelly-Springfield Motor Truck Co., Springfield, O.; Kissel, Kissel Motor Car Co., Hartford, Wis.; Kleiber, Kleiber & Co., San Francisco, Cal.

Mack, Mack Truck Co., Scranton, Pa.; Mack, Mack Brothers Motor Car Co., New York, N. Y.; Maxwell, Maxwell Motor Co., Detroit, Mich.; Milburn Electric, Milburn Wagon Co., Toledo, O.; Moreland, Moreland Motor Truck Co., Los Angeles, Cal.

Nash, Nash Motors Co., Kenosha, Wis.; Oldsmobile, Olds Motor Works, Lansing, Mich.; Oneida, Oneida Motor Truck Co., Green Bay, Wis.; Overland, Willys-Overland Co., Toledo, O.

Packard, Packard Motor Car Co., Detroit, Mich.; Paige, Paige-Detroit Motor Car Co., Detroit, Mich.; Pierce-Arrow, Pierce-Arrow Motor Car Co., Buffalo, N. Y.; Reo, Reo Motor Car Co., Lansing, Mich.; Republic, Republic Motor Truck Co., Alma, Mich.; Riker, Locomobile Co. of America, Bridgeport, Conn.; Rowe, Rowe Motor Manufacturing Co., Lancaster, Pa.

Sanford, Sanford Motor Truck Co., Syracuse, N. Y.; Saurer, Saurer Motor Co.,

New York, N. Y.; Schacht, G. A. Schacht Motor Truck Co., Cincinnati, O.; Selden, Selden Truck Corporation, Rochester, N. Y.; Service, Service Motor Truck Co., Wabash, Ind.; Standard, Standard Motor Truck Co., Detroit, Mich.; Sterling, Sterling Motor Truck Co., Milwaukee, Wis.; Stewart, Stewart Motor Corporation, Buffalo, N. Y.; Studebaker, Studebaker Corporation, South Bend, Ind.

United, United Motors Co., Grand Rapids, Mich.

Velle, Velle Motors Corporation, Moline, Ill.; Vim, Vim Motor Truck Co., Philadelphia, Pa.

Walter, Walter Motor Truck Co., New York, N. Y.; Ward, Ward Motor Vehicle Co., Mt. Vernon, N. Y.; White, White Motor Co., Cleveland, O.; Wilson, J. C. Wilson Co., Detroit, Mich.

NEW PLANT FOR KING MOTOR CAR CO.

The King Motor Car Co. recently secured an option on a 15-acre site in Detroit on which to construct a new plant for the production of King cars. This site is on the west side of the city, east of the Rouge river. It is nearly surrounded by the leading railroads of that section. On one side it is paralleled by the tracks and yard of the Michigan Central and the Lake Shore & Michigan Southern railroads. The Wabash and the Detroit, Toledo & Iowa railroads are within a short distance to the north. The Michigan Central railroad approaches on another side. The street side is Leigh avenue from Thaddeus street to Herkimer avenue. Dearborn avenue and West Jefferson trolleys are conveniently near and the adjacent locality supplies housing facilities for employees who wish to live near their work.

CUTLER-HAMMER BOOKLET.

"Making Driving Easy" is the title of a new 48-page booklet which, although printed by the maker of the CH magnetic gear shift, was really written by some of the 5000 motorists who have been driving cars equipped with this magnetic shift device during the past four years. Only a brief introduction has been written by the manufacturer, the Cutler-Hammer Manufacturing Co., Milwaukee, Wis. The running head reads, "Actual Owing and Driving Tests Are Better Than All Laboratory Tests." Excerpts giving opinions and data on operation are arranged according to states with several pages devoted to notes from motor car dealers handling cars with the C-H magnetic shift equipment.

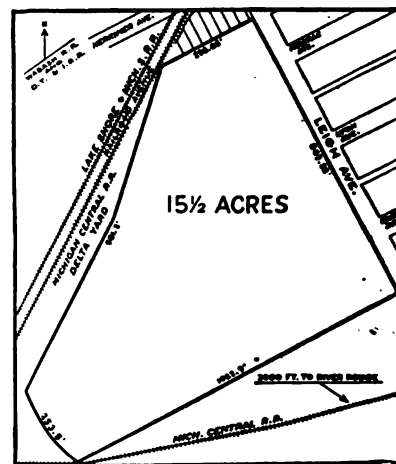
The inside back cover tells of the well known products made by this large manufacturer of electric control apparatus, among which are: C-H automobile lighting switches, C-H Seventy-Fifty switches, electric brakes, electric motor starters and controllers, lifting magnets, battery charging equipment, molded insulation, such as is used for radiator caps, fuse blocks, switch boxes, plugs, cable supports, etc.

On the cover is illustrated the new finger lever located on the quadrant above the steering wheel convenient for the thumb. This replaces the push button selector box formerly installed below the wheel.

Automotive Corporation Formed

Frank B. Ansted, president of the Lexington Motor Co., Connersville, Ind., has announced the formation of the United States Automotive Corporation, with a capitalization of \$10,000,000 preferred and 200,000 shares of common stock of no par value. This is a holding company only and its subsidiary companies will continue to operate without the loss of their corporate identities.

Included in the new corporation are the Lexington Motor Co., the Ansted Engineering Co., the Connersville Foundry Corporation and the Teetor-Hartley Motor Corporation. With the exception of the last named all of these concerns are located at Connersville, and all are engaged in the automotive trade. Of the four the Lexington Motor Co. is best known on account of the national and international sale of its product, the Lexington Minute Man Six.



Plan View of Site of New King Motor Car Factory at Detroit.

The other three companies are factors in Lexington's activities, however, since all are engaged in the production of important component parts.

The United States Automotive Corporation will produce a complete line of motor vehicles and, at the same time, provide vitally important sources for such material units as are not always purchasable on the open market.

The officers of the United States Automotive Corporation are as follows: President, Frank B. Ansted; vice presidents, George W. Ansted and Frederic I. Barrows; treasurer, James M. Heron; secretary, LeRoy A. Hanson. All of these gentlemen reside at Connersville, where the main offices of the United States Automotive Corporation will be located.

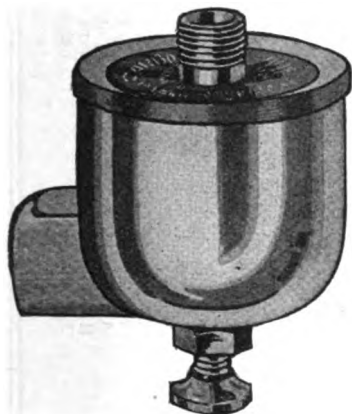
The other directors are: William B. Ansted, president of the Central Manufacturing Co.; Charles C. Hull, president of the Rex Manufacturing Co.; John C. Moore, chief engineer of the Lexington Motor Co.; Arthur A. Ansted, president of the Indiana Lamp Co., and Emery Huston, vice president of the Lexington Motor Co., all of Connersville, and Elmer J. Hess, director of the Standard Parts Co. of Cincinnati.

UNIVERSAL AUTOMATIC RE-CARBURETOR.

The Thomas-Armstrong Co., Inc., successor to C. B. Thomas, 1777-1779 Broadway, New York, is placing on the market a novel device in the Universal Automatic Re-Carburetor and Primer, which, it is stated, combines three important functions in one simple appliance. First, it is a carbon remover; second, a primer, and third, by giving the motor the proper gasoline mixture at the right time it increases mileage.

The Re-Carburetor is an aluminum air auxiliary valve which may be easily attached to the manifold of the engine, and is designed for use on automobiles, motor trucks, motor boats, aeroplanes, tractors, etc., which use gasoline, kerosene, alcohol or similar fluids for internal combustion.

It is pointed out that when the ordinary carburetor is adjusted as perfectly



Re-Carburetor Being Marketed by Thomas-Armstrong, Inc., New York City.

as possible, it still can supply only one density of gas at any given speed of the engine. If the vapor is rich enough to start and warm up the engine quickly and easily, it will be found too rich to give full value in power after getting under way and some of the fuel passes by the piston rings and finds its way into the cylinders, where it is consumed, forming a deposit of carbon.

After the engine has been running it can use a leaner mixture and the driver must change his adjustment so as to admit more air, and must keep regulating it as fast as the engine speed changes. The difficulty of always accomplishing this satisfactorily on many makes of cars proved the need and created a demand for some automatic device which would guarantee the amount of free air to be admitted to conform to the ever-changing speeds in driving, due to variations in grades, curves, bad roads, wind resistance from various directions, etc. The Re-Carburetor is designed to meet just this need.

The Re-Carburetor opens up and reduces the suction, taking in free air and preventing the whole inside surface of the manifold from accumulating gas moisture when started cold; that is, it will control the amount of the surface kept dry, instead of having all of it wet, no matter how fast or slow the engine may be running.

WESTON AUXILIARY WINDSHIELDS.

The Gartley-Weston Co., maker of automotive accessories, Real Estate building, Detroit, Mich., has just brought out



Weston Auxiliary Windshield.

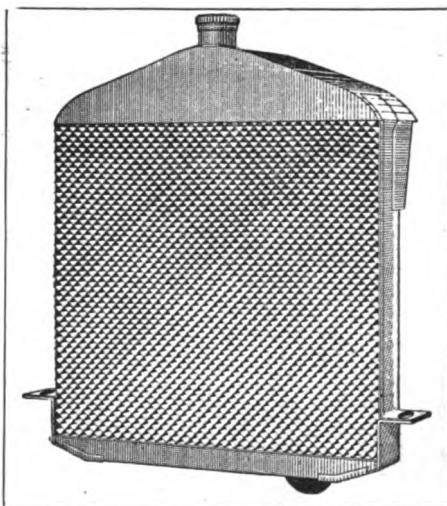
a windshield of the auxiliary type, which is designed for use on the automobile in all seasons.

In cold weather it keeps off wind and sleet, rain or snow from the occupants of the car, obviating disagreeable drafts across the face or around the neck. In warm weather they afford protection from rain, dust and hot currents.

As they are made of the best grade of heavy plate glass and the fixtures are of heavy brass, highly nicked, they are stated to add to the appearance of the car, as well as being a valued utility. A distinctive style can be supplied for each model of car, they are easily applied and adjusted for any desired position, do not interfere with the spot light or side curtains and will not rattle. They give 10 inches more of wind deflection on each side of the car. The accompanying illustration shows the method of application and adjustment.

The Gartley-Weston Co. is now allotting territory to distributors.

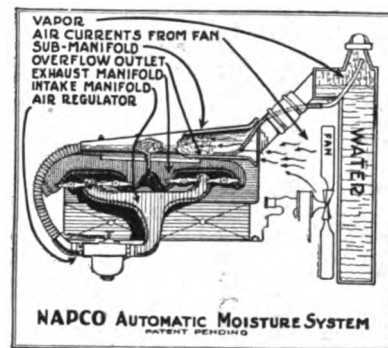
The Milwaukee Tank Works, Milwaukee, Wis., has announced an increase in the price of its products, effective Feb. 15, this being accompanied by important changes in wholesale jobbing and resale discounts.



Lober Non-Bursting Radiator.

IMPROVEMENT ON THE FORD STOVE.

The National Automotive Products Co., 331 The Arcade, Cleveland, O., is offering to the Ford trade the Napco automatic moisture system, which is designed to supply hot moist vapor to the regular air intake of the Ford carburetor. The working parts of the system consist of a funnel shaped sub-manifold made of aluminum, with a three-inch opening at the large end and tapering down to 1 1/4 inches at the small end. It is 15 inches long and is placed on top of the exhaust manifold. The bottom side is open and all the heat from the exhaust manifold enters and is driven back into the carburetor air intake by the air currents induced by the fan. A small flexible tubing connects this stove to the overflow pipe and all the moist vapor that would ordinarily pass out through the overflow pipe without being utilized is worked back through the motor automatically as the engine requires moisture.



A simple means is provided to take care of the overflow water either from boiling or in filling the radiator, and it is stated that it is impossible for any water to find its way into the carburetor.

The Napco automatic moisture system can be easily installed in 10 minutes time, is entirely automatic and has no moving parts. One hundred per cent. more mileage, greater power, more speed and flexibility, permitting the engine to pick up faster and run more smoothly in damp weather are guaranteed by the manufacturer, as well as elimination of carbon deposit.

LOBER NON-BURSTING RADIATORS.

The Nelson J. Quinn Co., Toledo, O., is putting on the market the Lober non-bursting radiator, which, it is claimed, absolutely eliminates all trouble from freezing even in extreme cold weather.

Its construction is as simple as it is effective to serve its purpose. Radiator is secured by vertical water ways formed by placing corrugated brass plates face to face. Wide strips of spring brass hold the plates firmly together so that the corrugations form in effect upright water tubes. Should freezing occur, no injury results it is claimed, as the plates merely separate enough to allow for the expansion and, when the water thaws, the springs bring the plates back as they were, undamaged, squarely in line and ready for business.

Directory of Passenger Car Manufacturers

Trade Names of Vehicles, Names of Makers and Their Addresses, by Cities and States, of 146 Principal Concerns Now Actively Engaged in the Industry

The Basis of This Directory is the Trade Names, Which Are Alphabetically Arranged, and Each Individual Group Is Identified by a Letter, So That Reference to Any One Can Be Made Almost Instantly. The Models Produced by These Concerns Are Included in the Mechanical Specifications That Appear on the Following Pages.

Trade Name	Manufacturer	Address	Trade Name	Manufacturer	Address
Allen	Allen Motor Co.	Postoria, O.	Du Pont	Du Pont Motor Mfg. Corp.	Wilmingon, Del.
Alsace	Automotive Products Corp.	New York, N. Y.	Duryea Gem	Duryea Motors, Inc.	Baltimore, Md.
American Beauty	Pan American Motors Corp.	Decatur, Ill.	Economy	Economy Motor Co.	Tiffin, O.
American	American Motors Corp.	Plainfield, N. J.	Elcar	Elkhart Carriage & Motor Car Co.	Elkhart, Ind.
Anderson	Anderson Motor Co.	Rock Hill, S. C.	Elgin	Elgin Motor Car Corp.	Chicago, Ill.
Apperson	Apperson Brothers Automobile Co.	Kokomo, Ind.	Erle	Erle Motor Co.	Painesville, O.
Argonne	Argonne Motor Car Co.	Jersey City, N. J.	Essex	Essex Motors, Inc.	Detroit, Mich.
Auburn	Auburn Automobile Co.	Auburn, Ind.			
Austin	Austin Automobile Co.	Grand Rapids, Mich.			
Beggs	Beggs Motor Car Co.	Kansas City, Mo.	Fiat	F. I. A. T.	New York, N. Y.
Bell	Bell Motor Car Co., Inc.	York, Pa.	Ford	Ford Motor Co.	Highland Park, Mich.
Biddle	Biddle Motor Car Co.	Philadelphia, Pa.	F. R. P.	Finley Robertson Porter Co.	Port Jefferson, N. Y.
Birch	Birch Motor Cars, Inc.	Chicago, Ill.	Franklin	H. H. Franklin Mfg. Co.	Syracuse, N. Y.
Bour-Davis	Louisiana Motor Car Co., Inc.	Shreveport, La.	Gardner	Gardner Motor Co.	St. Louis, Mo.
Brewster	Brewster & Co.	L. Island City, N. Y.	Geneva	Geneva Wagon Co.	Geneva, N. Y.
Briscoe	Briscoe Motor Corp.	Jackson, Mich.	Geronimo	Geronimo Motor Car Co.	Enid, Okla.
Buick	Buick Motor Co.	Flint, Mich.	Glide	Bartholomew Co.	Peoria, Ill.
Bush	Bush Motor Co.	Chicago, Ill.	Grant	Grant Motor Car Corp.	Cleveland, O.
Cadillac	Cadillac Motor Car Co.	Detroit, Mich.	Hackett	Hackett Motor Car Co.	Jackson, Mich.
Cameron	Cameron Motors Corp.	Stamford, Conn.	Halladay	Halladay Motor Car Co.	Mansfield, O.
Campbell	Campbell Motor Car Co.	Kingston, N. Y.	Hamilin-Holmes	Holmes Automobile Co.	Canton, O.
Case	J. I. Case Threshing Machine Co.	Racine, Wis.	Hanson	Hanson Motor Co.	Atlanta, Ga.
Chalmers	Chalmers Motor Co.	Detroit, Mich.	Harroun	Harroun Motors Corporation	Wayne, Mich.
Champion	Direct Drive Motor Co.	Philadelphia, Pa.	Harvard	Harvard-Pioneer Motor Car Corp.	Troy, N. Y.
Chandler	Chandler Motor Car Co.	Cleveland, O.	Hatfield	Cortland Cart & Carriage Co.	Sidney, N. Y.
Chevrolet	Chevrolet Motor Co.	New York, N. Y.	Haynes	Haynes Automobile Co.	Kokomo, Ind.
Cleveland	Cleveland Motor Co.	Cleveland, O.	Holmes	Holmes Automobile Co.	Canton, O.
Cole	Cole Motor Car Co.	Indianapolis, Ind.	Holmes	Holmes Automobile Co.	Canton, O.
Colonial	Colonial Automobile Co.	Detroit, Mich.	Hudson	Hudson Motor Car Co.	Chelsea, Mich.
Columbia	Columbia Motors Co.	Detroit, Mich.	Hupmobile	Hupp Motor Car Corp.	Detroit, Mich.
Comet	Comet Automobile Co.	Decatur, Ill.	Jones	Jones Motor Car Co.	Wichita, Kan.
Commonwealth	Commonwealth Motors Co.	Chicago, Ill.	Jordan	Jordan Motor Car Co.	Cleveland, O.
Crawford	Crawford Automobile Co.	Hagerstown, Md.	King	King Motor Car Co.	Detroit, Mich.
Crow-Elkhart	Crow-Elkhart Motor Co.	Elkhart, Ind.	Kissel	Kissel Motor Car Co.	Hartford, Wis.
Cunningham	James Cunningham Son & Co.	Rochester, N. Y.	Kline	Kline Car Corp.	Richmond, Va.
Daniels	Daniels Motor Car Co.	Reading, Pa.	Laurel	Laurel Motor Corp.	Anderson, Ind.
Davis	George W. Davis Motor Car Co.	Richmond, Ind.	Lenox	Lenox Motor Car Co.	Hyde Park, Mass.
Dispatch	Dispatch Motor Car Co., Inc.	Minneapolis, Minn.	Lexington	Lexington Motor Co.	Connersville, Ind.
Dixie Flyer	Dixie Motor Car Co.	Louisville, Ky.	Liberty	Liberty Motor Car Co.	Detroit, Mich.
Dodge Brothers	Dodge Brothers	Detroit, Mich.	Locomobile	Locomobile Co. of America	Bridgeport, Conn.
Dorris	Dorris Motor Car Co.	St. Louis, Mo.	Lorraine	Lorraine Motors Corp.	Grand Rapids, Mich.
Dort	Dort Motor Car Co.	Flint, Mich.	Lozier	Lozier Motor Car Co.	Detroit, Mich.
Douglas	Douglas Motors Corp.	Omaha, Neb.			

Trade Name	Manufacturer	Address	Trade Name	Manufacturer	Address
Madison	Bull Tractor-Madison Motors Corp.	Anderson, Ind.	Pilot	Pilot Motor Car Co.	Richmond, Ind.
Malbohm	Malbohm Motors Co.	Sandusky, O.	Premier	Premier Motor Corp.	Indianapolis, Ind.
Marmon	Nordyke & Marmon Co.	Indianapolis, Ind.	Reo	Reo Motor Car Co.	Lansing, Mich.
Marshall	Marshall Mfg. Co.	Chicago, Ill.	Revere	Revere Motor Car Corp.	Logansport, Ind.
McFarlan	McFarlan Motor Co.	Detroit, Mich.	Roamer	Barley Motor Car Co.	Kalamazoo, Mich.
Mercer	Mercer Motors Co.	Connersville, Ind.	Rock Falls	Rock Falls Mfg. Co.	Sterling, Ill.
Meteor	Meteor Motor Sales Co.	Trenton, N. J.	R. & V. Knight	Root & Van Dervoort Eng. Co.	East Moline, Ill.
Metz	Metz Sales Corp.	Piquin, O.	Saxon	Saxon Motor Car Corp.	Detroit, Mich.
Mitchell	Mitchell Motors Co.	Boston, Mass.	Sayers	Sayers & Scovill Co.	Cincinnati, O.
Monitor	Monitor Motor Car Co.	Racine, Wis.	Scripps-Booth	Scripps-Booth Corp.	Detroit, Mich.
Monroe	William Small Co.	Columbus, O.	Seneca	Seneca Motor Car Co.	Postoria, O.
Moon	Moon Motor Car Co.	Indianapolis, Ind.	Simples-Crane	Simples Automobile Co.	L. Island City, N. Y.
Moore	Moore Motor Vehicle Co.	St. Louis, Mo.	Singer	Singer Motor Co., Inc.	Mt. Vernon, N. Y.
Murray	Murray Motor Car Co.	Danville, Ill.	Spacke	Spacke Machine & Tool Co.	Indianapolis, Ind.
Nash	Nash Motors Co.	Newark, N. J.	Standard	Standard Steel Car Co.	Pittsburgh, Pa.
National Sextet	Nash Motors Co.	Kenosha, Wis.	Stearns-Knight	F. B. Stearns Co.	Cleveland, O.
Nelson	National Motor Car & Vehicle Corp.	Indianapolis, Ind.	Stephens	Moline Plow Co., Stephens Motor Branch	Moline, Ill.
Noma	E. A. Nelson Motor Car Co.	Detroit, Mich.	Studebaker	Studebaker Corp.	South Bend, Ind.
Norwalk	Noma Motor Corp.	New York, N. Y.	Stutz	Stutz Motor Car Co.	Indianapolis, Ind.
Oakland	Norwalk Motor Car Co.	Martinsburg, W. Va.	Templar	Templar Motors Corp.	Cleveland, O.
Oldsmobile	Oakland Motor Car Co.	Pontiac, Mich.	Texan	Texas Motor Car Ass'n.	Fort Worth, Tex.
Olympian	Olds Motor Works	Lansing, Mich.	Tulsa	Tulsa Auto Mfg. Co.	Tulsa, Okla.
Overland	Olympian Motors Co.	Pontiac, Mich.	Velle	Velle Motors Corp.	Moline, Ill.
Owen Magnetic	Willis-Overland Co.	Toledo, O.	Westcott	Westcott Motor Car Co.	Springfield, O.
Packard	Baker R & L Co.	Cleveland, O.	Willis-Knight	Willis-Overland Co.	Tellico, O.
Paige	Packard Motor Car Co.	Detroit, Mich.	Winton	Winton Co.	Cleveland, O.
Paterson	Paige-Detroit Motor Car Co.	Detroit, Mich.	Wolverine	Wolverine Motor Car Co.	Kalamazoo, Mich.
Peerless	W. A. Paterson Co.	Flint, Mich.	Doble-Detroit	Doble-Detroit Steam Motors Co.	Detroit, Mich.
Phaenna	Peerless Motor Car Co.	Cleveland, O.	Stanley	Stanley Motor Carriage Co.	Newton, Mass.
Piedmont	M. H. Carpenter	Lynchburg, Va.	Super-Steamer	Gearless Steam Auto Mfg. Co.	Denver, Col.
Pierce-Arrow	Piedmont Motor Car Co.	Buffalo, N. Y.			
Pilgrim	Pierce-Arrow Motor Car Co.	Detroit, Mich.			

Brief Facts and Features of the Automobile Industry in 1919

By Alfred Reeves, General Manager, National Automobile Chamber of Commerce.

Motor Car Manufacturers.	
Motor truck manufacturers in production.....	170
Passenger vehicle manufacturers in production.....	90
States in which factories are located.....	32
Employees in automobile factories.....	580,000
Passenger cars produced in 1919.....	1,586,787
Motor trucks produced in 1919.....	305,142
Total motor vehicles produced in 1919.....	1,891,929
Wholesale value of passenger cars produced in 1919.....	\$1,399,282,995
Wholesale value of motor trucks produced in 1919.....	\$408,311,585
Wholesale value of all vehicles produced in 1919.....	\$1,807,594,580
Average wholesale price of passenger cars produced in 1919.....	\$882
Average wholesale price of motor trucks produced in 1919.....	\$1,338
Automobile tires manufactured in 1919.....	30,000,000
Dealers, Garages, Etc.	
Total dealers, garages, repair shops, etc., in United States.....	62,036
Passenger car dealers.....	32,317
Motor truck dealers.....	18,943
Garages.....	36,247
Automobile repair shops.....	43,281
Value of motor vehicles and parts exported in 1919.....	\$146,334,516

Number of passenger automobiles exported in 1919.....	\$2,624
Value of passenger cars exported in 1919.....	\$68,945,740
Countries to which automobiles were exported.....	81
Number of commercial cars exported in 1919.....	14,748
Value of commercial cars exported in 1919.....	\$35,372,419

Motor Vehicles in Use.

Motor vehicles registered in United States, approximately.....	7,100,000
Motor vehicles in New York state.....	570,000
Motor trucks in use in United States.....	700,000
Tons of goods hauled yearly by trucks (estimated).....	2,200,000,000
Cost of haulage by motor trucks at 18 cents per ton mile.....	\$1,980,000,000
Cost of passenger service at railroad rate of 3 cents per mile.....	\$2,640,000,000
Value of passenger service at railroad rate of 3 cents per mile.....	\$2,525,000,000
Number of persons in United States to one motor car.....	15.96
Automobiles in United States for each square mile.....	2.1
Horses displaced by motor trucks in use (estimated).....	3,600,000
Acreage released by trucks for production of human foods.....	15,000,000
Greatest percentage of increase in car registrations, Tennessee.....	29
Greatest number of cars per capita, Iowa and Nebraska.....	1 for every 6 1/2 persons
Revenue to states from license fees.....	\$65,000,000
Farmers are largest users of trucks, owning 10 per cent. more than manufacturers and 15 per cent. more than retailers.	

Mechanical Specifications of Passenger Cars—1920

REVISED EACH MONTH

KEY OF ABBREVIATIONS: *Against name, first time listed. PRICE—C chassis; □ runabout; Δ 4-passenger. ENGINE—Colonial; Cont., Continental; Duesen., Duesenberg; H-Spill., Herschell-Spillman; G. B. S., Golden, Belknap & Swartz; Lyeng., Lycoming; Masnik., Massnick; North., Northway; Ruten., Rutenber; Ster., Sterling; T., Teeter; Wisc., Wisconsin. TYPE OF CYLINDER—L, valves on opposite sides of cylinder; I, valves on one side of cylinder; F, valves on head; F, valves on side and in head; S, sleeve valve. CAMSHAFT DRIVE—Hel., Helical; Chin., Chain; Str., Spur; G., Gear. ENGINE COOLING SYSTEM—P, Pump circulation; T, Thermo-Siphon circulation; Th., Thermostatic control of circulation; A, Air Cooling. OILING SYSTEM—F, Force Feed; S, Splash. IGNITION SYSTEM—Eisen., Eisenmann; West., Westinghouse; Conn., Connecticut; G & D, Gray & Davis; Al-Ch., Allis-Chalmers; At-K, Atwater Kent; Auto., Autolite; Split., Splitdorf; U. S. L., U. S. Lighting & Heating; W. L. Leon., Ward Leonard; N. E. S., Splash. CAMSHAFT DRIVE—Hel., Helical; Chin., Chain; Str., Spur; G., Gear. ENGINE COOLING SYSTEM—P, Pump circulation; T, Thermo-Siphon circulation; Th., Thermostatic control of circulation; A, Air Cooling. OILING SYSTEM—F, Force Feed; S, Splash. IGNITION SYSTEM—Eisen., Eisenmann; West., Westinghouse; Conn., Connecticut; G & D, Gray & Davis; Al-Ch., Allis-Chalmers; At-K, Atwater Kent; Auto., Autolite; Split., Splitdorf; U. S. L., U. S. Lighting & Heating; W. L. Leon., Ward Leonard; N. E. S., Splash. CAMSHAFT DRIVE—Hel., Helical; Chin., Chain; Str., Spur; G., Gear. ENGINE COOLING SYSTEM—P, Pump circulation; T, Thermo-Siphon circulation; Th., Thermostatic control of circulation; A, Air Cooling. OILING SYSTEM—F, Force Feed; S, Splash. IGNITION SYSTEM—Eisen., Eisenmann; West., Westinghouse; Conn., Connecticut; G & D, Gray & Davis; Al-Ch., Allis-Chalmers; At-K, Atwater Kent; Auto., Autolite; Split., Splitdorf; U. S. L., U. S. Lighting & Heating; W. L. Leon., Ward Leonard; N. E. S., Splash.

TRADE NAME AND MODEL	TIRES AND RIMS		ENGINE										IG. NITION SYSTEM	Car-buretor	REAR AXLE				BEARINGS													
	Price Touring Car	Weight of Car	Wheels in Inches	Size	Make of Rims	Make of Engine	Number of Cylinders	Bore and Stroke in Inches	Piston Displacement	Rated H. P. S. A. E.	Max. Brake H. P.	Cylinder Type			Cylinders Cast	Wh. P. Ring Groove	Diam. Inlet Valve	Lift of Valve	Cam Shaft Drive	Type of Cooling System	Type of Oiling System	Make and Type	Make of Starting and Lighting System	Make	Feed by	Clutch Type	Gear Location and Forward Speeds	REAR AXLE		No. Crankshaft Bcs.	Rear Axle	Front Wheel
																												Type	Type of Gears				Gear Ratio	Torque Taken By Car Driven Through	Type of Rear Springs
Allen, 43	1395	2508 110	32x4	32x4	Firestone	Own	4	4 3/4 x 5 1/2	192 19 60	37 2200 L	Blk	4	1 1/2	1 1/2	1 1/2	Hel	T-S	F & S	Conn S-H	Auto Dyneto-2	Stimp V	V	D D	U P 3	Columbia	F	Sp B	4 40 10	S	35-R-K	R	
Alcove	1485	2600 116	32x4	32x4	Firestone	H-Spill	4	4 3/4 x 5 1/2	224 25 35	48 2400 L	Blk	4	1 1/2	1 1/2	1 1/2	Hel	T-S	F & S	At-K S-H	West	Stimp V	V	D D	U P 3	Standard	S-F	Sp B	4 45 8	S	35-R-K	R	
American Beauty	2000	2900 121	34x4 1/2	34x4 1/2	Firestone	Cont	4	4 3/4 x 5 1/2	224 25 35	48 2400 L	Blk	4	1 1/2	1 1/2	1 1/2	Hel	T-S	F & S	At-K S-H	West	Stimp V	V	D D	U P 3	Timken	S-F	Sp B	4 45 8	S	35-R-K	R	
American	1865	2900 122	32x4 1/2	32x4 1/2	Firestone	Ruten	4	4 3/4 x 5 1/2	224 25 35	48 2400 L	Blk	4	1 1/2	1 1/2	1 1/2	Hel	T-S	F & S	At-K S-H	West	Stimp V	V	D D	U P 3	Timken	S-F	Sp B	4 45 8	S	35-R-K	R	
Anderson 400-C	1675	2750 120	33x4 1/2	33x4 1/2	Firestone	Cont	4	4 3/4 x 5 1/2	224 25 35	48 2400 L	Blk	4	1 1/2	1 1/2	1 1/2	Hel	T-S	F & S	Conn	West-2	Zeni G	G	D D	U P 3	Columbia	F-F	Sp B	4 42 8	S	35-R-K	R	
Anderson De Lux	1775	2750 120	33x4 1/2	33x4 1/2	Firestone	Cont	4	4 3/4 x 5 1/2	224 25 35	48 2400 L	Blk	4	1 1/2	1 1/2	1 1/2	Hel	T-S	F & S	Conn	West-2	Zeni G	G	D D	U P 3	Columbia	F-F	Sp B	4 42 8	S	35-R-K	R	
Anderson Anniver	2000	3000 130	34x4 1/2	34x4 1/2	Firestone	Own	4	4 3/4 x 5 1/2	332 33 80	65 2500 L	Blk	4	1 1/2	1 1/2	1 1/2	Hel	T-S	F & S	Remy D-H	Biur-2	John V	V	D D	U P 3	Own	F	Sp B	4 25 8	S	35-R-K	R	
Aperson 8-20	2950	3600 130	34x4 1/2	34x4 1/2	Firestone	Own	4	4 3/4 x 5 1/2	332 33 80	65 2500 L	Blk	4	1 1/2	1 1/2	1 1/2	Hel	T-S	F & S	Remy D-H	Biur-2	John V	V	D D	U P 3	Own	F	Sp B	4 25 8	S	35-R-K	R	
Arnone	4000	119	32x4	32x4	Firestone	Cont	4	4 3/4 x 5 1/2	226 22 50	42 2200 L	Blk	4	1 1/2	1 1/2	1 1/2	Hel	T-S	F & S	Remy S-H	West	Rayf V	V	D D	U P 3	Columbia	F-F	Sp B	4 42 8	S	35-R-K	R	
Auburn 6-30H	1695	2800 120	33x4 1/2	33x4 1/2	Firestone	Cont	4	4 3/4 x 5 1/2	224 25 35	42 2200 L	Blk	4	1 1/2	1 1/2	1 1/2	Hel	T-S	F & S	Remy S-H	Remy-2	Rayf V	V	D D	U P 3	Spec. Austin	F-F	Sp B	4 42 8	S	35-R-K	R	
Austin, 12	4250	142	34x4 1/2	34x4 1/2	Firestone	Weidely	4	4 3/4 x 5 1/2	389 39 68	58 2400 L	Blk	4	1 1/2	1 1/2	1 1/2	Hel	T-S	F & S	Delco S-H	Delco-2	Stimp V	V	D D	U P 6	Spec. Austin	F-F	Sp B	4 42 8	S	35-R-K	R	
Bears Six	1630	2840 120	33x4	33x4	Firestone	Cont	4	4 3/4 x 5 1/2	224 25 35	42 2200 L	Blk	4	1 1/2	1 1/2	1 1/2	Hel	T-S	F & S	Conn	Auto	Stimp V	V	D D	U P 3	Timken	3/4 F	Sp B	4 25 8	S	35-R-K	R	
Bell, 18	1395	114	31x4	31x4	Firestone	GRAS	4	4 3/4 x 5 1/2	188 22 50	32 2800 L	Blk	4	1 1/2	1 1/2	1 1/2	Hel	T-S	F & S	At-K S-H	Auto	Stimp V	V	D D	U P 3	Peru	3/4 F	Sp B	4 25 8	S	35-R-K	R	
Biddle, 18	2985	3250 121	32x4 1/2	32x4 1/2	Firestone	Buda	4	4 3/4 x 5 1/2	226 22 50	44 2200 L	Blk	4	1 1/2	1 1/2	1 1/2	Hel	T-S	F & S	Boech	G & D-2	Stimp V	V	D D	U P 4	Standard	3/4 F	Sp B	4 00 8	S	35-R-K	R	
Birch Light Six 40	1495	2880 115	32x4	32x4	Stanwell	Beaver	4	4 3/4 x 5 1/2	230 23 44	45 2200 L	Blk	4	1 1/2	1 1/2	1 1/2	Hel	T-S	F & S	Conn	Remy	Stimp V	V	D D	U P 3	Timken	3/4 F	Sp B	4 15 8	S	35-R-K	R	
Birch Super-Four	1085	2200 115	32x4 1/2	32x4 1/2	Stanwell	Lyeng	4	4 3/4 x 5 1/2	192 19 60	36 1800 L	Blk	4	1 1/2	1 1/2	1 1/2	Hel	T-S	F & S	At-K	Dyneto-2	Stimp V	V	D D	U P 3	Peru	3/4 F	Sp B	4 25 8	S	35-R-K	R	
Bour-Davis	1850	2900 118	32x4	32x4	Perlan	Lyeng	4	4 3/4 x 5 1/2	224 25 35	42 2100 L	Blk	4	1 1/2	1 1/2	1 1/2	Hel	T-S	F & S	Remy	Auto	Stimp V	V	D D	U P 3	Salisbury	3/4 F	Sp B	4 25 8	S	35-R-K	R	
Brewster	7200	125	34x4 1/2	34x4 1/2	Firestone	Own	4	4 3/4 x 5 1/2	276 25 28	22 2000 L	Blk	4	1 1/2	1 1/2	1 1/2	Hel	T-S	F & S	Boech S-H	U S L-1	Stimp V	V	D D	U P 3	Own	3/4 F	Sp B	4 25 8	S	35-R-K	R	
Bryce 4-24	985	2100 104	30x3 1/2	30x3 1/2	Cleveland	Cont	4	4 3/4 x 5 1/2	163 16 25	30 2000 L	Blk	4	1 1/2	1 1/2	1 1/2	Hel	T-S	F & S	Conn S-H	Auto-2	Stimp V	V	D D	U P 3	W. Mott	S-F	Sp B	4 07 7	T	4 B & R	R	
Buick H-45	1495	118	33x4 1/2	33x4 1/2	Baker	Own	4	4 3/4 x 5 1/2	241 27 34	60	Blk	4	1 1/2	1 1/2	1 1/2	Hel	T-S	F & S	Delco S-H	Delco-1	Stimp V	V	D D	U P 3	W. Mott	S-F	Sp B	4 07 7	T	4 B & R	R	
Buick H-49	1785	124	34x4 1/2	34x4 1/2	Baker	Own	4	4 3/4 x 5 1/2	241 27 34	60	Blk	4	1 1/2	1 1/2	1 1/2	Hel	T-S	F & S	Delco S-H	Delco-1	Stimp V	V	D D	U P 3	W. Mott	S-F	Sp B	4 61 7	T	4 B & R	R	
Bush	1395	2450 116	32x3 1/2	32x3 1/2	Firestone	Lyeng	4	4 3/4 x 5 1/2	192 19 60	35 2500 L	Blk	4	1 1/2	1 1/2	1 1/2	Hel	T-S	F & S	At-K	Dyneto-2	Stimp V	V	D D	U P 3	Salisbury	F-F	Sp B	4 00 7	T	4 B & R	R	
Cadillac, 57	3490	125	35x5	35x5	Kelsey	Own	4	4 3/4 x 5 1/2	314 31 25	2650 L	Blk	4	1 1/2	1 1/2	1 1/2	Ch	P+	F	Delco S-A	Delco-1	Own V	V	D D	U P 3	Timken	F	Sp B	4 43 8	A	35-R-K	R	
Cameron, 55	1400	108	32x4	32x4	Own	Own	4	4 3/4 x 5 1/2	192 19 60	35 2500 L	Blk	4	1 1/2	1 1/2	1 1/2	Ch	P	F	Delco S-A	Delco-1	Rayf V	V	D D	U P 3	Timken	F	Sp B	4 43 8	A	35-R-K	R	
Campbell	1701	123	32x4	32x4	U S	Own	4	4 3/4 x 5 1/2	189 33 75	2500 L	Blk	4	1 1/2	1 1/2	1 1/2	Ch	P	F	At S-H	Auto	Rayf V	V	D D	U P 3	Salisbury	F-F	Sp B	4 25 8	S	35-R-K	R	
Cass	595	2000 110	30x3 1/2	30x3 1/2	Firestone	Cont	4	4 3/4 x 5 1/2	303 29 40	55 2000 L	Blk	4	1 1/2	1 1/2	1 1/2	Ch	P	F & S	At S-H	Auto	Amer V	V	D D	U P 3	Salisbury	F-F	Sp B	4 25 8	S	35-R-K	R	
Chalmers, 6-30	2200	3300 126	32x4 1/2	32x4 1/2	Kelsey	Own	4	4 3/4 x 5 1/2	224 25 35	45 2650 L	Blk	4	1 1/2	1 1/2	1 1/2	Ch	P	F & S	Delco	West	Rayf V	V	D D	U P 3	Columbia	3/4 F	Sp B	4 25 8	S	35-R-K	R	
Chalmers, 6-30	1765	2950 122	33x4	33x4	Kelsey	Own	4	4 3/4 x 5 1/2	224 25 35	45 2650 L	Blk	4	1 1/2	1 1/2	1 1/2	Ch	P	F & S	Remy S-H	Auto	Stimp V	V	D D	U P 3	Timken	S-F	Sp B	4 25 8	S	35-R-K	R	
Champion	1190	116	32x3 1/2	32x3 1/2	Own	Own	4	4 3/4 x 5 1/2	224 25 35	45 2650 L	Blk	4	1 1/2	1 1/2	1 1/2	Ch	P	F & S	Remy S-H	Auto	Stimp V	V	D D	U P 3	Timken	S-F	Sp B	4 25 8	S	35-R-K	R	
Champion	1205	116	32x3 1/2	32x3 1/2	Own	Own	4	4 3/4 x 5 1/2	224 25 35	45 2650 L	Blk	4	1 1/2	1 1/2	1 1/2	Ch	P	F & S	Remy S-H	Auto	Stimp V	V	D D	U P 3	Timken	S-F	Sp B	4 25 8	S	35-R-K	R	
Chandler	1795	2985 123	33x4	33x4	Fredelev	Own	4	4 3/4 x 5 1/2	289 29 40	58 2400 L	Blk	4	1 1/2	1 1/2	1 1/2	Ch	P	F & S	Boech S-H	West-2	Rayf V	V	D D	U P 3	Own	F	Sp B	4 40 8	A	35-R-K	R	
Chevrolet, 400	735	1800 102	30x3 1/2	30x3 1/2	Demont	Own	4	4 3/4 x 5 1/2	171 21 75	38 2000 L	Blk	4	1 1/2	1 1/2	1 1/2	Ch	P	F & S	Remy S-H	Auto-2	Zeni V	V	D D	U P 3	Own	3/4 F	Sp B	3 63 8	S	35-R-K	R	
Chevrolet, F B	1235	3200 110	32x4	32x4	Demont	Own	4	4 3/4 x 5 1/2	224 25 35	45 2650 L	Blk	4	1 1/2	1 1/2	1 1/2	Ch	P	F & S	Remy S-H	Auto-2	Zeni V	V	D D	U P 3	Own	3/4 F	Sp B	3 63 8	S	35-R-K	R	
Cleveland	1355	112	32x4	32x4	Firestone	Own	4	4 3/4 x 5 1/2	191 21 60	36 1800 L	Blk	4	1 1/2	1 1/2	1 1/2	Ch	P	F & S	Delco	G & D	Stimp V	V	D D	U P 3	Own	3/4 F	Sp B	4 25 8	S	35-R-K	R	
Climber Six	2395	127	32x4 1/2	32x4 1/2	Firestone	Own	4	4 3/4 x 5 1/2	303 29 40	55 2000 L	Blk	4	1 1/2	1 1/2	1 1/2	Ch	P	F & S	Delco	West	Stimp V	V	D D	U P 3	Own	3/4 F	Sp B	4 25 8	S	35-R-K	R	
Clover Four	1500	112	32x3 1/2	32x3 1/2	Firestone	H. Spill	4	4 3/4 x 5 1/2	303 29 40	55 2000 L	Blk	4	1 1/2	1 1/2	1 1/2	Ch	P	F & S	Delco	West	Stimp V	V	D D	U P 3	Own	3/4 F	Sp B	4 25 8	S	35-R-K	R	
Coler, 870	2750	3350 127	33x4	33x4	Goodyear	North	4	4 3/4 x 5 1/2	346 39 22	80 2800 L	Blk	4	1 1/2	1 1/2	1 1/2	Hel	T-S	F & S	Delco S-H	Delco-2	Stimp V	V	D D	U P 3	Columbia	F	Sp B	4 40 8	S	35-R-K	R	
Colonial, 35	1095	2785 116	32x4 1/2	32x4 1/2	Goodyear	Falls	4	4 3/4 x 5 1/2	191 21 60	38 2000 L	Blk	4	1 1/2	1 1/2	1 1/2	Hel	T-S	F & S	Delco S-H	Delco-2	Stimp V	V	D D	U P 3	Columbia	F	Sp B	4 40 8	S	35-R-K	R	
Columbia Six 1C	1695	2800 118	32x4	32x4	Firestone	Cont	4	4 3/4 x 5 1/2	224																							

TRADE NAME AND MODEL	TIRES AND RIMS			ENGINE										IG-NITION SYSTEM	Make of Starting-Lighting System	Car-buretor	REAR AXLE				BEARINGS											
	Weight of Car Ready for Road	Wheelbase in Inches	Size	Make of Rims	Make of Engine	Number of Cylinders	Bore and Stroke in Inches	Piston Displacement	Rated H. P. S. A. E.	Max. Brake H. P. R. P. M. at Max.	Cylinder Type	Cylinders Cast	Wh. P. Ring Groove				Lift of Valve (Clear)	Cam Shaft Drive	Type of Cooling System	Type of Oiling System	Make and Type	Clutch Type	Gear Location and Forward Speeds	Make	Type of Gears	Gear Ratio	Torque Taken By Car Driven Through	Type of Rear Springs	No. Crankshaft Bars	Gearset	Rear Axle	Front Wheel
Dodge Brothers.	1000	2600 114	32x3 1/2	35x5	Own	Own	43 1/2x43 1/2	212 24.03	35 2200 L			3	Blk	1 1/2	1 1/2	Hel	T-S	F & S	N-E A-H	N. East-1	Stew	U P 3	U P 3	U P 3	U P 3	U P 3	U P 3	U P 3	U P 3	U P 3	U P 3	
Dorris, 6-80.	4350	3750 132	32x3 1/2	35x5	Frestone	Own	64x5 1/2	377 88.40	80 2400 L			3	Blk	1 1/2	1 1/2	Hel	T-S	F & S	Boch S-H	West-2	Stumb	U P 3	U P 3	U P 3	U P 3	U P 3	U P 3	U P 3	U P 3	U P 3	U P 3	
Dort.	985	2300 109 1/2	30x3 1/2	33x4	Cleveland	H-Spill	83 1/2x5	192 19.60	32 2000 L			4	Blk	1 1/2	1 1/2	Hel	T-S	F & S	Conn S-H	West-2	Cart	U P 3	U P 3	U P 3	U P 3	U P 3	U P 3	U P 3	U P 3	U P 3	U P 3	
Douglas.	2000	2800 122	32x4	33x4	Frestone	Own	83 1/2x5	322 33.80	75 2400 L			4	Blk	1 1/2	1 1/2	Hel	T-S	F & S	Conn S-H	West-2	Cart	U P 3	U P 3	U P 3	U P 3	U P 3	U P 3	U P 3	U P 3	U P 3	U P 3	
Du Pont, A.	4000	3200 124	32x4 1/2	33x4	Frestone	Own	43 1/2x43 1/2	247 84.00	55 2000 L			4	Blk	1 1/2	1 1/2	Hel	T-S	F & S	Mag	Own	Scib	U P 3	U P 3	U P 3	U P 3	U P 3	U P 3	U P 3	U P 3	U P 3	U P 3	
Duryea Gem.	4000	3200 124	28x3	32x4	Standard	Spacke	23 1/2x35 1/2	71 9.80	13 2500 L			1	Blk	1 1/2	1 1/2	Hel	T-S	F & S	Mag	Own	Scib	U P 3	U P 3	U P 3	U P 3	U P 3	U P 3	U P 3	U P 3	U P 3	U P 3	
Economy, 6-46.	1795	2750 115	32x4	33x4	Frestone	Cont	63 1/2x43 1/2	224 25.35	42 2200 L			4	Blk	1 1/2	1 1/2	Hel	T-S	F & S	Conn	Auto	Zeni	U P 3	U P 3	U P 3	U P 3	U P 3	U P 3	U P 3	U P 3	U P 3	U P 3	
Elcar, D-4.	1395	2740 116	32x4	33x4	Frestone	Lycmg	63 1/2x43 1/2	192 19.60	38 2100			4	Blk	1 1/2	1 1/2	Hel	T-S	F & S	Conn	Auto	Zeni	U P 3	U P 3	U P 3	U P 3	U P 3	U P 3	U P 3	U P 3	U P 3	U P 3	
Elcar, D-6.	1595	2850 116	32x4	33x4	Frestone	Cont	63 1/2x43 1/2	224 25.35	35 2100			4	Blk	1 1/2	1 1/2	Hel	T-S	F & S	Delco	Delco	Stumb	U P 3	U P 3	U P 3	U P 3	U P 3	U P 3	U P 3	U P 3	U P 3	U P 3	
Elgin.	1485	2650 118	32x4	33x4	Frestone	Falls	63 1/2x43 1/2	196 23.44	40 2000 L			4	Blk	1 1/2	1 1/2	Hel	T-S	F & S	Delco	Delco	Stumb	U P 3	U P 3	U P 3	U P 3	U P 3	U P 3	U P 3	U P 3	U P 3	U P 3	
Erie.	850	2300 118	32x4	33x4	Stanwell	GB&S	63 1/2x43 1/2	188 22.50	35 2000 L			4	Blk	1 1/2	1 1/2	Hel	T-S	F & S	Wagner	Wagner	Stumb	U P 3	U P 3	U P 3	U P 3	U P 3	U P 3	U P 3	U P 3	U P 3	U P 3	
Exeac.	1495	2580 108 1/2	32x4 1/2	32x4	Kelsey	Own	43 1/2x43 1/2	179 18.22	55 2800 F			4	Blk	1 1/2	1 1/2	Hel	T-S	F & S	Split	Dyneto	Stumb	U P 3	U P 3	U P 3	U P 3	U P 3	U P 3	U P 3	U P 3	U P 3	U P 3	
Fiat, 55.	6000	4335 140	35x6	35x6	Frestone	Own	45 1/2x45 1/2	557 42.03	35 2000 L			4	Blk	1 1/2	1 1/2	Hel	T-S	F & S	Delco	Delco	Stumb	U P 3	U P 3	U P 3	U P 3	U P 3	U P 3	U P 3	U P 3	U P 3	U P 3	
Ford, T. 45 (16 valve).	575	1480 100	30x3 1/2	33x4	Clincher	Own	43 1/2x43 1/2	177 22.50	20 1400 L			4	Blk	1 1/2	1 1/2	Hel	T-S	F & S	Boch D-H	West-2	Zeni	U P 3	U P 3	U P 3	U P 3	U P 3	U P 3	U P 3	U P 3	U P 3	U P 3	
F. R. P. 45 (16 valve).	7000	3500 140	30x5	32x4	D Wheels	Own	44 1/2x44 1/2	448 34.28	35 2000 L			4	Blk	1 1/2	1 1/2	Hel	T-S	F & S	Boch S-H	West-2	Zeni	U P 3	U P 3	U P 3	U P 3	U P 3	U P 3	U P 3	U P 3	U P 3	U P 3	
Franklin, 9-B.	2750	2445 115	32x4	33x4	Goodyear	Own	63 1/2x43 1/2	199 25.35	35 2000 L			4	Blk	1 1/2	1 1/2	Hel	T-S	F & S	At K S-A	Boch-2	Long	U P 3	U P 3	U P 3	U P 3	U P 3	U P 3	U P 3	U P 3	U P 3	U P 3	
Gardner G.	1125	2400 112	32x3 1/2	33x4	Jaxon	Lycmg	43 1/2x43 1/2	192 19.60	35 2000 L			4	Blk	1 1/2	1 1/2	Hel	T-S	F & S	West	Dyneto	Own	U P 3	U P 3	U P 3	U P 3	U P 3	U P 3	U P 3	U P 3	U P 3	U P 3	
Geneva.	2900	3130	32x4 1/2	33x4	D Wheels	H-Spill	63 1/2x43 1/2	415 13.40	45 2400 L			4	Blk	1 1/2	1 1/2	Hel	T-S	F & S	East n S-H	West-2	Rayf	U P 3	U P 3	U P 3	U P 3	U P 3	U P 3	U P 3	U P 3	U P 3	U P 3	
Geronimo.	1550	2700 122	32x4	33x4	Frestone	Ruten	63 1/2x43 1/2	230 23.44	45 2400 L			4	Blk	1 1/2	1 1/2	Hel	T-S	F & S	Delco	Dyneto	Stumb	U P 3	U P 3	U P 3	U P 3	U P 3	U P 3	U P 3	U P 3	U P 3	U P 3	
Globe, 40.	1655	2850 119	32x4	33x4	Goodyear	Ruten	63 1/2x43 1/2	230 23.44	45 2400 L			4	Blk	1 1/2	1 1/2	Hel	T-S	F & S	West S-H	West-2	Stumb	U P 3	U P 3	U P 3	U P 3	U P 3	U P 3	U P 3	U P 3	U P 3	U P 3	
Grant H.	1495	2500 110	32x4	33x4	Goodyear	Own	63 1/2x43 1/2	196 23.44	40 2500 L			4	Blk	1 1/2	1 1/2	Hel	T-S	F & S	At-K S-H	Wagner-2	Stumb	U P 3	U P 3	U P 3	U P 3	U P 3	U P 3	U P 3	U P 3	U P 3	U P 3	
Hackett.	1114	2400 112	32x4	33x4	Goodyear	H-Spill	43 1/2x43 1/2	192 19.60	35 2000 L			4	Blk	1 1/2	1 1/2	Hel	T-S	F & S	W.S.L. S-H	West	John	U P 3	U P 3	U P 3	U P 3	U P 3	U P 3	U P 3	U P 3	U P 3	U P 3	
Halladay, 22.	1955	2750 118	32x4	33x4	Frestone	Ruten	63 1/2x43 1/2	230 23.44	46 2400 L			4	Blk	1 1/2	1 1/2	Hel	T-S	F & S	At-K	West	Stumb	U P 3	U P 3	U P 3	U P 3	U P 3	U P 3	U P 3	U P 3	U P 3	U P 3	
Hamlin-Holmes.	350	1200 100	30x3 1/2	32x4	Goodyear	Own	43 1/2x43 1/2	113 14.40	35 2000 L			4	Blk	1 1/2	1 1/2	Hel	T-S	F & S	At-K	West	Stumb	U P 3	U P 3	U P 3	U P 3	U P 3	U P 3	U P 3	U P 3	U P 3	U P 3	
Hanson.	1855	2000 100	30x3 1/2	32x4	Stanwell	Cont	43 1/2x43 1/2	224 25.35	35 2000 L			4	Blk	1 1/2	1 1/2	Hel	T-S	F & S	Remy	Remy-2	Stumb	U P 3	U P 3	U P 3	U P 3	U P 3	U P 3	U P 3	U P 3	U P 3	U P 3	
Harrod, A.	995	2000 100	30x3 1/2	32x4	Baker	Own	43 1/2x43 1/2	174 16.90	48 2400 L			4	Blk	1 1/2	1 1/2	Hel	T-S	F & S	Remy	Remy-2	Stumb	U P 3	U P 3	U P 3	U P 3	U P 3	U P 3	U P 3	U P 3	U P 3	U P 3	
Harvard, 4-20.	850	2000 100	28x3	32x4	Stanwell	Own	43 1/2x43 1/2	120 14.40	38 2400 L			4	Blk	1 1/2	1 1/2	Hel	T-S	F & S	Conn	Dyneto	Zeni	U P 3	U P 3	U P 3	U P 3	U P 3	U P 3	U P 3	U P 3	U P 3	U P 3	
Halford, A-42.	1695	115	32x4	33x4	Frestone	Own	43 1/2x43 1/2	16 90	42 2000 L			4	Blk	1 1/2	1 1/2	Hel	T-S	F & S	Conn	Dyneto	Zeni	U P 3	U P 3	U P 3	U P 3	U P 3	U P 3	U P 3	U P 3	U P 3	U P 3	
Haynes 45.	2685	3225 127	32x4 1/2	33x4 1/2	Frestone	Own	125 1/2x5 1/2	289 29.40	50 2000 L			6	Blk	1 1/2	1 1/2	Hel	T-S	F & S	Kings	Lees N-2	Rayf	U P 3	U P 3	U P 3	U P 3	U P 3	U P 3	U P 3	U P 3	U P 3	U P 3	
Haynes 46.	3450	3700 127	32x4 1/2	33x4 1/2	Goodyear	Own	125 1/2x5 1/2	356 36.30	70 2200 L			6	Blk	1 1/2	1 1/2	Hel	T-S	F & S	Delco SHA	Lees N-2	Rayf	U P 3	U P 3	U P 3	U P 3	U P 3	U P 3	U P 3	U P 3	U P 3	U P 3	
Haynes 47.	2800	2800 120	32x4 1/2	33x4 1/2	Goodyear	Own	63 1/2x43 1/2	245 25.35	40 1650 L			4	Blk	1 1/2	1 1/2	Hel	T-S	F & S	Eise n S-H	West	Novo	U P 3	U P 3	U P 3	U P 3	U P 3	U P 3	U P 3	U P 3	U P 3	U P 3	
Hollier, 206.	1955	2800 120	32x4 1/2	33x4 1/2	Frestone	Cont	63 1/2x43 1/2	224 25.35	43 2200 L			4	Blk	1 1/2	1 1/2	Hel	T-S	F & S	Remy	S-H	West	U P 3	U P 3	U P 3	U P 3	U P 3	U P 3	U P 3	U P 3	U P 3	U P 3	
Hudson Super 6.	2200	3200 125 1/2	32x4 1/2	33x4 1/2	Kelsey	Own	63 1/2x43 1/2	288 29.40	76 2450 L			4	Blk	1 1/2	1 1/2	Hel	T-S	F & S	Delco SHA	Delco-1	Own	U P 3	U P 3	U P 3	U P 3	U P 3	U P 3	U P 3	U P 3	U P 3	U P 3	
Hupmobile, R. O.	1450	2450 112	32x4 1/2	33x4 1/2	Kelsey	Own	43 1/2x43 1/2	183 16.90	35 2000 L			4	Blk	1 1/2	1 1/2	Hel	T-S	F & S	At-K S-H	West 2	Stumb	U P 3	U P 3	U P 3	U P 3	U P 3	U P 3	U P 3	U P 3	U P 3	U P 3	
Jones B-28.	2250	3																														

TRADE NAME AND MODEL	TIRES AND RIMS				ENGINE					IG-NITION SYSTEM		Car-buretor		REAR AXLE				BEARINGS																	
	Weight of Car	Weight of Car Ready for Road	Wheels in Inches	Size	Make of Rims	Make of Engine	Number Cylinders	Bore and Stroke in Inches	Piston Displacement	Rated H. P. S. A. E.	Max. Brake H. P. R. P. M. at Max.	Cylinder Type	Cylinders Cast	With P. Ring Groove	Diam. Inlet Valve	Lift of Valve	Cam Shaft Drive	Type of Cooling System	Type of Ignition System	Make and Type	Make of Starting-Lighting System	Make	Feed by	Clutch Type	Gear Location and Forward Speeds	Make	Type	Type of Gears	Gear Ratio	Torque Taken By (Car Driven Through)	Type of Rear Springs	No. of Shaft Bases	Gearset	Rear Axle	Front Wheel
Monroe, S-9	1295	2376 115	32x3 1/2	32x3 1/2	Firestone	Own	4	3 1/2 x 5 1/2	149 1/2	90	44 2000	Blk	4	1 1/2	1 1/2	1 1/2	1 1/2	Hel	P, S, L	F, S, S	Conn S-H	Wagner	Zen	V	D	U P 3	Trunk	S-F	Sp B	4.50 S	A	C Cant	2 1/2	R	R
Moore, 30-SF	1385	2600 108	32x3 1/2	32x3 1/2	Firestone	Blk	4	3 1/2 x 5 1/2	149 1/2	90	44 2000	Blk	4	1 1/2	1 1/2	1 1/2	1 1/2	Hel	P, S, L	F, S, S	Conn S-H	Wagner	Zen	V	D	U P 3	Trunk	S-F	Sp B	4.50 S	A	C Cant	2 1/2	R	R
Moore, 30-F	1385	2600 108	32x3 1/2	32x3 1/2	Firestone	Blk	4	3 1/2 x 5 1/2	149 1/2	90	44 2000	Blk	4	1 1/2	1 1/2	1 1/2	1 1/2	Hel	P, S, L	F, S, S	Conn S-H	Wagner	Zen	V	D	U P 3	Trunk	S-F	Sp B	4.50 S	A	C Cant	2 1/2	R	R
Nash, 681	1490	2850 121	32x4	32x4	Firestone	Own	6	3 1/2 x 5 1/2	203 25	35	67 2600	Blk	6	1 1/2	1 1/2	1 1/2	1 1/2	Hel	P, S, L	F, S, S	Wagner S-H	Wagner	Mary	V	D	U P 3	Own	S-F	Sp B	4.50 S	A	C Cant	2 1/2	R	R
National Sixtett	1500	2850 121	32x4	32x4	Firestone	Own	6	3 1/2 x 5 1/2	203 25	35	67 2600	Blk	6	1 1/2	1 1/2	1 1/2	1 1/2	Hel	P, S, L	F, S, S	Wagner S-H	Wagner	Mary	V	D	U P 3	Own	S-F	Sp B	4.50 S	A	C Cant	2 1/2	R	R
Nelson, Ford-29	1500	2850 121	32x4	32x4	Firestone	Own	6	3 1/2 x 5 1/2	203 25	35	67 2600	Blk	6	1 1/2	1 1/2	1 1/2	1 1/2	Hel	P, S, L	F, S, S	Wagner S-H	Wagner	Mary	V	D	U P 3	Own	S-F	Sp B	4.50 S	A	C Cant	2 1/2	R	R
Noma, A	1500	2850 121	32x4	32x4	Firestone	Own	6	3 1/2 x 5 1/2	203 25	35	67 2600	Blk	6	1 1/2	1 1/2	1 1/2	1 1/2	Hel	P, S, L	F, S, S	Wagner S-H	Wagner	Mary	V	D	U P 3	Own	S-F	Sp B	4.50 S	A	C Cant	2 1/2	R	R
Norwalk	1500	2850 121	32x4	32x4	Firestone	Own	6	3 1/2 x 5 1/2	203 25	35	67 2600	Blk	6	1 1/2	1 1/2	1 1/2	1 1/2	Hel	P, S, L	F, S, S	Wagner S-H	Wagner	Mary	V	D	U P 3	Own	S-F	Sp B	4.50 S	A	C Cant	2 1/2	R	R
Oakland, 34-B	1075	2170 112	32x4	32x4	Firestone	Own	6	3 1/2 x 5 1/2	177 18	97	44 2600	Blk	6	1 1/2	1 1/2	1 1/2	1 1/2	Hel	P, S, L	F, S, S	Wagner S-H	Wagner	Mary	V	D	U P 3	Own	S-F	Sp B	4.50 S	A	C Cant	2 1/2	R	R
Oldsmobile, 37-A	1305	2452 112	32x4	32x4	Firestone	Own	6	3 1/2 x 5 1/2	177 18	97	44 2600	Blk	6	1 1/2	1 1/2	1 1/2	1 1/2	Hel	P, S, L	F, S, S	Wagner S-H	Wagner	Mary	V	D	U P 3	Own	S-F	Sp B	4.50 S	A	C Cant	2 1/2	R	R
Oldsmobile, 45-B	1895	3150 112	32x4 1/2	32x4 1/2	Firestone	Own	8	3 1/2 x 5 1/2	248 26	55	58 2600	Blk	8	1 1/2	1 1/2	1 1/2	1 1/2	Hel	P, S, L	F, S, S	Wagner S-H	Wagner	Mary	V	D	U P 3	Own	S-F	Sp B	4.50 S	A	C Cant	2 1/2	R	R
Olympic, 4	1240	1946 108	32x3 1/2	32x3 1/2	Firestone	Own	4	3 1/2 x 5 1/2	143 18	90	40 2600	Blk	4	1 1/2	1 1/2	1 1/2	1 1/2	Hel	P, S, L	F, S, S	Wagner S-H	Wagner	Mary	V	D	U P 3	Own	S-F	Sp B	4.50 S	A	C Cant	2 1/2	R	R
Overland, 4	845	1946 108	32x3 1/2	32x3 1/2	Firestone	Own	4	3 1/2 x 5 1/2	143 18	90	40 2600	Blk	4	1 1/2	1 1/2	1 1/2	1 1/2	Hel	P, S, L	F, S, S	Wagner S-H	Wagner	Mary	V	D	U P 3	Own	S-F	Sp B	4.50 S	A	C Cant	2 1/2	R	R
Owen Magnetic, W-2	6500	5200 142	35x5 1/2	35x5 1/2	Firestone	Own	6	3 1/2 x 5 1/2	143 18	90	40 2600	Blk	6	1 1/2	1 1/2	1 1/2	1 1/2	Hel	P, S, L	F, S, S	Wagner S-H	Wagner	Mary	V	D	U P 3	Own	S-F	Sp B	4.50 S	A	C Cant	2 1/2	R	R
Packard, 3-25	5200	4455 128	35x5 1/2	35x5 1/2	Firestone	Own	6	3 1/2 x 5 1/2	143 18	90	40 2600	Blk	6	1 1/2	1 1/2	1 1/2	1 1/2	Hel	P, S, L	F, S, S	Wagner S-H	Wagner	Mary	V	D	U P 3	Own	S-F	Sp B	4.50 S	A	C Cant	2 1/2	R	R
Packard, 3-35	5550	4400 136	35x5 1/2	35x5 1/2	Firestone	Own	6	3 1/2 x 5 1/2	143 18	90	40 2600	Blk	6	1 1/2	1 1/2	1 1/2	1 1/2	Hel	P, S, L	F, S, S	Wagner S-H	Wagner	Mary	V	D	U P 3	Own	S-F	Sp B	4.50 S	A	C Cant	2 1/2	R	R
Paige-Linwood, 6-40	1595	2802 117	32x4	32x4	Firestone	Own	6	3 1/2 x 5 1/2	143 18	90	40 2600	Blk	6	1 1/2	1 1/2	1 1/2	1 1/2	Hel	P, S, L	F, S, S	Wagner S-H	Wagner	Mary	V	D	U P 3	Own	S-F	Sp B	4.50 S	A	C Cant	2 1/2	R	R
Paige, Essex, 6-55	2150	3373 127	34x4 1/2	34x4 1/2	Firestone	Own	6	3 1/2 x 5 1/2	168 16	100	50 3000	Blk	6	1 1/2	1 1/2	1 1/2	1 1/2	Hel	P, S, L	F, S, S	Wagner S-H	Wagner	Mary	V	D	U P 3	Own	S-F	Sp B	4.50 S	A	C Cant	2 1/2	R	R
Pann, A	2300	3373 127	34x4 1/2	34x4 1/2	Firestone	Own	6	3 1/2 x 5 1/2	168 16	100	50 3000	Blk	6	1 1/2	1 1/2	1 1/2	1 1/2	Hel	P, S, L	F, S, S	Wagner S-H	Wagner	Mary	V	D	U P 3	Own	S-F	Sp B	4.50 S	A	C Cant	2 1/2	R	R
Peterson, 6-46	1695	2900 125	34x4 1/2	34x4 1/2	Firestone	Own	6	3 1/2 x 5 1/2	168 16	100	50 3000	Blk	6	1 1/2	1 1/2	1 1/2	1 1/2	Hel	P, S, L	F, S, S	Wagner S-H	Wagner	Mary	V	D	U P 3	Own	S-F	Sp B	4.50 S	A	C Cant	2 1/2	R	R
Peterson, 56	2000	3500 125	34x4 1/2	34x4 1/2	Firestone	Own	6	3 1/2 x 5 1/2	168 16	100	50 3000	Blk	6	1 1/2	1 1/2	1 1/2	1 1/2	Hel	P, S, L	F, S, S	Wagner S-H	Wagner	Mary	V	D	U P 3	Own	S-F	Sp B	4.50 S	A	C Cant	2 1/2	R	R
Pennay, 18	1585	2600 110	32x4	32x4	Firestone	Own	6	3 1/2 x 5 1/2	168 16	100	50 3000	Blk	6	1 1/2	1 1/2	1 1/2	1 1/2	Hel	P, S, L	F, S, S	Wagner S-H	Wagner	Mary	V	D	U P 3	Own	S-F	Sp B	4.50 S	A	C Cant	2 1/2	R	R
Pennay, 6-18	1585	2600 110	32x4	32x4	Firestone	Own	6	3 1/2 x 5 1/2	168 16	100	50 3000	Blk	6	1 1/2	1 1/2	1 1/2	1 1/2	Hel	P, S, L	F, S, S	Wagner S-H	Wagner	Mary	V	D	U P 3	Own	S-F	Sp B	4.50 S	A	C Cant	2 1/2	R	R
Phaeta, N-30	1095	112	32x4 1/2	32x4 1/2	Firestone	Own	6	3 1/2 x 5 1/2	168 16	100	50 3000	Blk	6	1 1/2	1 1/2	1 1/2	1 1/2	Hel	P, S, L	F, S, S	Wagner S-H	Wagner	Mary	V	D	U P 3	Own	S-F	Sp B	4.50 S	A	C Cant	2 1/2	R	R
Piedmont, N-30	1095	112	32x4 1/2	32x4 1/2	Firestone	Own	6	3 1/2 x 5 1/2	168 16	100	50 3000	Blk	6	1 1/2	1 1/2	1 1/2	1 1/2	Hel	P, S, L	F, S, S	Wagner S-H	Wagner	Mary	V	D	U P 3	Own	S-F	Sp B	4.50 S	A	C Cant	2 1/2	R	R
Pierce-Arrow, 38	7250	4370 134	34x4 1/2	34x4 1/2	Firestone	Own	6	3 1/2 x 5 1/2	168 16	100	50 3000	Blk	6	1 1/2	1 1/2	1 1/2	1 1/2	Hel	P, S, L	F, S, S	Wagner S-H	Wagner	Mary	V	D	U P 3	Own	S-F	Sp B	4.50 S	A	C Cant	2 1/2	R	R
Pierce-Arrow, 48	7750	5103 142	35x5 1/2	35x5 1/2	Firestone	Own	6	3 1/2 x 5 1/2	168 16	100	50 3000	Blk	6	1 1/2	1 1/2	1 1/2	1 1/2	Hel	P, S, L	F, S, S	Wagner S-H	Wagner	Mary	V	D	U P 3	Own	S-F	Sp B	4.50 S	A	C Cant	2 1/2	R	R
Pilgrim	895	2350 110	32x4	32x4	Firestone	Own	6	3 1/2 x 5 1/2	168 16	100	50 3000	Blk	6	1 1/2	1 1/2	1 1/2	1 1/2	Hel	P, S, L	F, S, S	Wagner S-H	Wagner	Mary	V	D	U P 3	Own	S-F	Sp B	4.50 S	A	C Cant	2 1/2	R	R
Pilot, 6-45	2890	120	32x4	32x4	Firestone	Own	6	3 1/2 x 5 1/2	168 16	100	50 3000	Blk	6	1 1/2	1 1/2	1 1/2	1 1/2	Hel	P, S, L	F, S, S	Wagner S-H	Wagner	Mary	V	D	U P 3	Own	S-F	Sp B	4.50 S	A	C Cant	2 1/2	R	R
Premier, 6-45	2585	3400 125 1/2	32x4 1/2	32x4 1/2	Firestone	Own	6	3 1/2 x 5 1/2	168 16	100	50 3000	Blk	6	1 1/2	1 1/2	1 1/2	1 1/2	Hel	P, S, L	F, S, S	Wagner S-H	Wagner	Mary	V	D	U P 3	Own	S-F	Sp B	4.50 S	A	C Cant	2 1/2	R	R
Reo, T-6	1650	2935 120	33x4	33x4	Firestone	Own	6	3 1/2 x 5 1/2	168 16	100	50 3000	Blk	6	1 1/2	1 1/2	1 1/2	1 1/2	Hel	P, S, L	F, S, S	Wagner S-H	Wagner	Mary	V	D	U P 3	Own	S-F	Sp B	4.50 S	A	C Cant	2 1/2	R	R
Ri-Chard	8000	4500 137	34x6	34x6	Firestone	Own	6	3 1/2 x 5 1/2	168 16	100	50 3000	Blk	6	1 1/2	1 1/2	1 1/2	1 1/2	Hel	P, S, L	F, S, S	Wagner S-H	Wagner	Mary	V	D	U P 3	Own	S-F	Sp B	4.50 S	A	C Cant	2 1/2	R	R
Revere, B	3850	3850 131	32x4 1/2	32x4 1/2	Firestone	Own	6	3 1/2 x 5 1/2	168 16	100	50 3000	Blk	6	1 1/2	1 1/2	1 1/2	1 1/2	Hel	P, S, L	F, S, S	Wagner S-H	Wagner	Mary	V	D	U P 3	Own	S-F	Sp B	4.50 S	A	C Cant	2 1/2	R	R
Roamer, C-6-54	3150	128	32x4	32x4	Firestone	Own	6	3 1/2 x 5 1/2	168 16	100	50 3000	Blk	6	1 1/2	1 1/2	1 1/2	1 1/2	Hel	P, S, L	F, S, S	Wagner S-H	Wagner	Mary	V	D	U P 3	Own	S-F	Sp B	4.50 S	A	C Cant	2 1/2	R	R
Rock Falls, 10	3150	128	32x4	32x4	Firestone	Own	6	3 1/2 x 5 1/2	168 16	100	50 3000	Blk	6	1 1/2	1 1/2	1 1/2	1 1/2	Hel	P, S, L	F, S, S	Wagner S-H	Wagner	Mary	V	D	U P 3	Own	S-F	Sp B	4.50 S	A	C Cant	2 1/2	R	R
R. & V. Knight, J	3150	128	32x4	32x4	Firestone	Own	6	3 1/2 x 5 1/2	168 16	100	50 3000	Blk	6	1 1/2	1 1/2	1 1/2	1 1/2	Hel	P, S, L	F, S, S	Wagner S-H	Wagner	Mary	V	D	U P 3	Own	S-F	Sp B	4.50 S	A	C Cant	2 1/2	R	R
R. & V. Knight, R	3150	128	32x4	32x4	Firestone	Own	6	3 1/2 x 5 1/2	168 16	100	50 3000	Blk	6	1 1/2	1 1/2	1 1/2	1 1/2	Hel	P, S, L	F, S, S	Wagner S-H	Wagner	Mary	V	D	U P 3	Own	S-F	Sp B	4.50 S	A	C Cant	2 1/2	R	R
Saxon, Six	1295	2376 112	32x3 1/2	32x3 1/2	Firestone	Own	4	3 1/2 x 5 1/2	149 1/2	90	44 2000	Blk	4	1 1/2	1 1/2	1 1/2	1 1/2	Hel	P, S, L	F, S, S	Conn S-H	Wagner	Zen	V	D	U P 3	Trunk								

TRADE NAME AND MODEL	Price Touring Car	Weight of Car Ready for Road	TIRES AND RIMS		ENGINE										IG-NITION SYSTEM	REAR AXLE				BEARINGS																	
			Wheelbase in Inches	Size	Make of Rims	Make of Engine	Number of Cylinders	Bore and Stroke in Inches	Piston Displacement	Rated H. P., S. A. E.	Max. Brake H. P.	H. P. at Max.	Cylinder Type	Cylinders Cast		Wh. P. Ring Groove	Diam. Inlet Valve (Clear)	Lift of Valve	Cam Shaft Drive	Type of Cooling System	Type of Oiling System	Make and Type	Make of Starting-Lighting System	Make	Fed by	Clutch Type	Gearset Location and Forward Speeds	Make	Type	Type of Gears	Gear Ratio	Car Driven Through Torque Taken By	Type of Rear Springs	No. Crankshaft Bcs.	Gearset	Rear Axle	Front Wheel
Waco, T-37	950	2350/112	32x3 1/2	32x3 1/2	Firestone	Cont	4	3 3/4 x 4 1/2	188.22	50	37	50	1	Blk	1 1/4	1 1/4	1 1/4	Hel	T	F & S	Split	Delco	Schb	V	D	U P 3	Timken	S-F	S-F	S-F	5.09 S	Semi	4 R	B	R	R	
Westcott, B-38	2300	3100/118	33x4	33x4	Firestone	Cont	6	3 3/4 x 5 1/4	223.25	35	56	2690 L	Blk	6	1 1/4	1 1/4	1 1/4	Hel	P	F & S	Delco	Rayf	V	D	U P 3	Timken	S-F	S-F	S-F	5.09 S	Semi	4 R	B	R	R		
Westcott, A-48	2800	3200/125	32x4 1/2	32x4 1/2	Firestone	Cont	6	3 3/4 x 5 1/4	303.29	40	50	1900 L	Blk	6	1 1/4	1 1/4	1 1/4	Hel	P	F & S	Delco	Rayf	V	D	U P 3	Timken	S-F	S-F	S-F	5.09 S	Semi	4 R	B	R	R		
Willye-Knight, 88-4	1725	3695/121	34x4 1/2	34x4 1/2	Stanwell	Own	4	4 1/4 x 5 1/4	240.27	23	53	2200 S	Blk	2	1 1/4	1 1/4	1 1/4	Hel	T-S	F & S	Conn S	Auto-2	V	D	U P 4	Timken	S-F	S-F	S-F	4.30 T	Cont	3 B	B	R	R		
Winton, 33	3950	3870/132	35x5	35x5	Firestone	Own	6	3 3/4 x 5 1/4	348.33	75	70	2200 L	Blk	2	1 1/4	1 1/4	1 1/4	Hel	P	F & S	Bosch S-H	Bijur-2	Stumb	V	D	U P 4	Timken	S-F	S-F	S-F	4.30 T	Semi	3 B	B	R	R	
Winton, 48	4350	4440/138	35x5	35x5	Firestone	Own	6	4 1/4 x 5 1/4	525.48	60	80	1800 L	Blk	2	1 1/4	1 1/4	1 1/4	Hel	P	F & S	Bosch	Bijur-2	Stumb	V	D	U P 4	Timken	S-F	S-F	S-F	4.30 T	Semi	3 B	B	R	R	
Wolverine	3500	2340/117	32x4 1/2	32x4 1/2	Firestone	Duesen	6	4 3/4 x 6	209.25	60	90	2600	Blk	2	1 1/4	1 1/4	1 1/4	Hel	P	F & S	Bosch	Bijur	Mill	V	D	U P 4	Timken	S-F	S-F	S-F	2.94	Semi	3 B	B	R	R	

SPECIFICATIONS OF STEAM PASSENGER CARS

Name and Model	Price	Wheel-Base	Type of Boiler	Boiler Location	Fuel Used	Burner Type	Condensing or Non-Condensing	Type of Engine	Type of Valve Gear	Type of Valves	No. Cyl.	Bore and Stroke	Engine Location	Final Drive	Gear Ratio	Tire Size	Type of Rear Spring	Car Drives Through	Torque Taken by
Double Detroit Steam, 735	5000	125	Semi Flash	Hood	Kero	Atomizing Vaporizing Burnson	Condensing	Simplex D Act	Own	Slide	2	54	Rear Axle	Spur Gr	1.28	35x5	Semi	Through	Eng. Frame
Super-Steamer	3740	120	Fire Tube	Hood	Kero		Condensing	Simplex D Act	Slide Link	Slide	2	45	Rear Axle	Spur Gr	1.50	35x4 1/2	Elliptic	Through	Eng. Frame
	3000	125	Fire Tube	Hood	Kero		Condensing	Simplex D Act	Slide Link	Slide	4	3 1/2	Rear Axle	No Gr		33x4	Semi	Through	Eng. Frame

HARE'S MOTORS TAKES OVER THREE CONCERNS.

Hare's Motors has been organized for the purpose of directing and co-ordinating the production and distribution of the Mercer Motors Co., the Locomobile Co. of America and the Simplex Automobile Co., Inc., with the following organization:

President, Emlen S. Hare, formerly vice president, Packard Motor Car Co.; vice president in charge of engineering development, H. D. Church, formerly chief engineer, motor truck division, Packard Motor Car Co.; vice president in charge of production, Ormond E. Hunt, formerly chief engineer, motor carriage division, Packard Motor Car Co.; vice president in charge of distribution and maintenance, Henry Lansdale, formerly general carriage sales manager, Packard Motor Car Co.; vice president and consulting engineer, A. L. Riker, formerly vice president and chief engineer, Locomobile Co. of America; secretary and treasurer, F. R. Hickman, formerly treasurer, Locomobile Co. of America.

A brief history of this merger includes the acquiring of the property of the Mercer Automobile Co. in October, 1919, by the Mercer Motors Co.; in December, 1919, the Locomobile Co. was organized to take over the property of the Locomobile Co. of America, the Mercer Motors Co. receiving a substantial interest in the Locomobile Co. In January, 1920, the Mercer Motors Co. absorbed the Simplex Automobile Co., manufacturer of Simplex and Crane-Simplex cars. And the recent organization of Hare's Motors assumes the directing power of all these companies.

Its object is to produce a complete line of the highest grade of passenger cars and freight transportation units and, in furtherance of this object, to increase materially and immediately the output of all the plants under its control, and to provide that in so doing that there shall be no waste of plant space or of effort in any respect.

The New York office of Hare's Motors is 16 West 61st street.

EISEMANN MAGNETOS FOR DIXIE FLYER.

The Eisemann Magneto Corporation, Brooklyn, N. Y., has received a contract to supply the magneto equipment for the Dixie Flyer, the passenger car being built by the Kentucky Wagon Manufacturing Co., Louisville, Ky. This company has used Eisemann magnetos as standard equipment on its trucks for some time.

Other contracts recently signed for Eisemann magnetos are the following: Maccar Truck Co., Scranton, Pa., covering a period of 12 months; Superior Motor Truck Co., Atlanta, Ga.; Commerce Motor Truck Co., Detroit, Mich.; Barber-Green Co., manufacturer of conveying machinery, Aurora, Ill.

The Eisemann Magneto Corporation is represented at Washington, D. C., by the Auto-Electric Service Co., which is a sub-station of the Automotive Engineering Co., Baltimore, Md., the Eisemann official service representative.

AMERICAN-LA FRANCE CO. TO BUILD TRUCKS.

It is announced that the American-La France Fire Engine Co. has commenced the manufacture of commercial motor vehicles, and is now completing its first series of trucks in its plant at Elmira, N. Y. The line comprises the following sizes: Five, 3 1/2, 2 1/2 and 1 1/2-ton, for the permanent production of which the company has acquired a tract of more than 23 acres in Bloomfield, N. J., on which a modern plant is being erected.

In the design of this new commercial truck the company has followed the same high standards employed in the construction of its fire apparatus, along the most approved and modern designs adopted by the best commercial car builders. All parts are made in its own plant and will embody the well known American-La France qualities.

The company has branch sales rooms and service stations in Boston, New York, Philadelphia, Atlanta, Pittsburgh, Dallas, Chicago, Minneapolis, Denver, San Francisco, Los Angeles, Portland, Ore., and Toronto, Canada.

PURITAN PURCHASES A. B. C. STARTER.

The Puritan Machine Co., Lafayette boulevard and 10th street, Detroit, Mich., has purchased the stock, tools, dies, jigs, blue prints, etc., of the A. B. C. Starter Co., manufacturer of electric starting and lighting equipment for Ford cars. Service parts and repairs for all A. B. C. starter equipment will henceforth be supplied from the Puritan plant.

Wetmore-Savage Co. Makes Phenomenal Growth

A YEAR ago was recorded the purchase of the Boston branch of the Motor Car Equipment Co., 180 Massachusetts avenue, by the Wetmore-Savage Co., electrical jobbers, of 76 Pearl street, Boston.

This energetic and far sighted firm saw the possibilities of the coming years in the automotive equipment line, the advantage of an up-town location in the heart of the automobile district, and the opportunity for a high-grade jobbing house conducted for the New England trade, by New England men, with a broad-minded, aggressive and sound business policy along lines already established in the electrical line down town.

Its plans comprised the conservative building up of an able organization with knowledge of the line and the New England trade, the equipment of adequate quarters with all modern facilities for conducting an efficient jobbing business, and the establishment of business

outside of the local field is under the general direction of E. E. Warfield who for nine years was district salesman in Connecticut and Western Massachusetts

the Motor Car Equipment Co. in the same position. Credits are handled by H. T. Watkins, formerly in the advertising department of the Motor Car Equipment Co. in New York and later connected with the sales and credit end of the same company in Boston.

The growth of the Wetmore-Savage company in the automotive equipment line has been rapid, but along sound, conservative lines. Swinging into the field as a practically new organization, it has emphasized the idea of service as a basis for its entire business fabric. This implies a complete and carefully selected stock of representative lines, carefully kept up to date, ample capital to insure facility of operation, efficiency of personnel, and courteous attention at all times to individual wants of customers.

Service is the aim of the entire organization.

The Wetmore-Savage Co., under the



E. W. Littlefield, Sales Department, Wetmore-Savage Co.

methods founded upon the element of service developed to the highest point possible.

It was expected that at least a year would have to be spent in preparatory work along these lines with volume a more than secondary consideration; but the season was scarcely in full swing before a phenomenal increase in business had rendered the original quarters inadequate and forced new construction to provide for increasing demands.

A second story over the old motor car building was completed in December, but by February still more space was demanded by the growing business and work is now started on further expansion which will eventually extend the Wetmore-Savage plant over an entire city block. This latter addition is to house the extensive Gould storage battery department, which will be moved to the up-town branch. This department is administered by M. F. Robbins, Jr., a storage battery expert, for 12 years connected with the sales and service organization of a prominent electrical manufacturer.

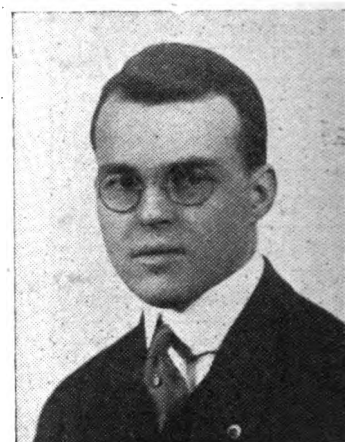
The entire New England territory is covered by a corps of 30 salesmen, of which the group traveling the territory



V. C. Bruce Wetmore.

for the Motor Car Equipment Co., traveling both from the New York and Boston offices. Elmer W. Littlefield, for nine years prominent in the automotive equipment trade in Maine, and for three years in the sales end of the Wetmore-Savage automobile department at 76 Pearl street, has direct supervision of sales in the metropolitan district.

The office administration of sales and service is in charge of John C. Lane, who has served in the same capacity at



E. E. Warfield, Sales Department, Wetmore-Savage Co.

management of V. C. Bruce Wetmore and Hanson M. Savage, started in the electrical supplies business about 14 years ago in a modest way. Since then it has developed a business second to none in its line in New England.

The Wetmore-Savage Co. does an exclusively wholesale business and among the well known lines for which it is the New England distributor are Gould storage batteries, Holophane lenses, Auburn tires, Hart-Bell pumps, F-W automatic windshield cleaners, automatic Extension reel lights, H & D shock absorbers, Ajax and Red Devil jacks.

The Wetmore-Savage Co. will exhibit at the Boston show the week of March 13-20, in space 430, Department E, Mechanics' building, where a representative showing of the lines handled by the company will be demonstrated.

MULLINS CO'S DIVIDEND.

The W. H. Mullins Co., Salem, O., manufacturer of automobile bodies, reports net profits for the seven months ending Dec. 31 sufficient for a dividend of \$2.32 a share on common stock.



Hanson M. Savage.

the down town office since the automobile department was started.

The purchasing department is in the hands of R. P. Greene, well known to the trade through his connection with

HAYES WHEEL CO. FORMS COALITION.

The Hayes Wheel Co., Jackson, Mich., has formed a consolidation with the Pioneer Pole & Shaft Co., Piqua, O., and a number of southern branches, which is stated to be merely the logical outgrowth of a long existing relationship. The Pioneer Co., which has been a large stockholder in the Hayes Co. for a considerable period, is the largest operator in hickory wood in the United States, and has supplied the wheel company with material, and the reported merger is formed largely to insure for the Hayes Co. a supply of hickory for its product. The new arrangement will also render available sufficient working capital to carry large stocks of material which the proportions now attained by the organization requires. How great these requirements have become may be judged from fact that consolidated concerns expect to do a business of \$25,000,000 in 1920.



H. T. Watkins, Credit Department, Wetmore-Savage Co.

With a production running around 4,000,000 wheels a year, including wire and steel felloe types, the Hayes company is recognized as one of the big factors in this industry.

STERNO CORPORATION TO BUILD PLANT.

The Sterno Corporation, Baltimore, Md., recently incorporated with a capital of \$500,000 by interests connected with the United States Industrial Chemical Co., the United States Industrial Alcohol Co. and the Curtis Bay Copper & Iron Co., all of Curtis Bay, is planning the erection of a large plant in the vicinity of Baltimore for the manufacture of alcohol burning devices for automobile service, electric heating and cooking devices, to cost, with equipment, in excess of \$400,000.

The incorporators are Patrick H. Loftus, William D. Tucker and Stewart M. Seymour. Carl Haner, Jr., of the United States Industrial Alcohol Co., is also active in the new concern.



R. P. Greene, Purchasing Department, Wetmore-Savage Co.

BOWER BEARING BUSINESS SHOWS SURPLUS.

The annual statement of the Bower Roller Bearing Co., Detroit, Mich., recently made public, shows a surplus of \$380,872 Jan. 1, before reserves for federal taxes. Assets amounting to \$1,043,975 include \$275,083 in plant and machinery before the allowance of \$129,103 for depreciation; \$263,237 in inventories; \$150,000 in certificates of deposit; \$116,830 in cash and \$106,837 in accounts receivable.

The capital stock remains at \$600,000 authorized and outstanding, the par value of which is \$10 a share.

GOODYEAR ISSUES RACING RESUME.

A booklet giving a resume of the 1919 automobile racing season has been issued by the Goodyear Tire & Rubber Co., Akron, O. It is gotten out in attractive

form and is profusely illustrated. It is dedicated to "those courageous young men who drive the racing cars" to whom it is stated "the automobile industry and the great motoring public owe a debt of gratitude for the part they have played in contributing the valuable lessons of the speedways to the advancement of automobile development."

The subject is treated under the following heads: "The Place of Racing in Automobile Development," "Racing Tires," "How Automobile Races Are Timed," "The Pits," "Goodyear Service at the Speedways," "The World's Fastest at Speedways," "World's Fastest Mile on Tires 150 Miles an Hour on Goodyears," "Durant's Triumph at Santa Monica," "Sarles' Ride to Victory at Ascot," "Milton's Drive at Uniontown," "Howard Wilcox's Triumph at Indianapolis—Goodyears First in the American Classic," "New Record at Sheepshead Bay," "Louis Chevrolet's High Score at Tacoma," "Gaston Chevrolet Wins at Sheepshead," "Milton Repeats at Uniontown," "Milton



M. F. Robbins, Jr., Battery Department, Wetmore-Savage Co.

Leads Revived Elgin Classic," "Boyer Takes Labor Day Event—First Three Cars Goodyear Shod," "Gaston Wins Chevrolet Duel," "Boyer Ends Season with Victory" and "Post Season Racing Review."

This is a compilation that will appeal particularly to the automobile racing enthusiast and any one interested may receive a copy by applying to the Goodyear Co.

ADDITION TO CLEVELAND FACTORY.

The Cleveland Automobile Co., Cleveland, O., will have a factory addition ready for occupancy about March 15. This extension, 200 by 80 feet, four stories high, will increase the total dimensions of the plant to 1000 by 80 feet, containing 320,000 square feet. The factory is located on a 19-acre site on the main line of the Nickel Plate railroad and when the annex is finished will enable the company to reach its desired schedule of 150 cars a day.



J. C. Lane, Office Sales and Service, Wetmore-Savage Co.

New Booty Vacuum Carburetor

A CARBURETOR that is claimed to be entirely new and original in principle, extremely simple in construction, which is maintained to have exclusive and distinguishing qualities, radically from other carbureting instruments, is the Booty, the details of which have just been made public.

The principle of operation is clearly shown in the accompanying sectional illustration. When the throttle valve is partially open the piston (b) rises and creates an area of opening around the cone (c). This admits the volume of air required by the opening of the throttle, and the grooves in the fuel metering pin (d), which are very shallow at the top and gradually deepen to the bottom, permit the measurement of the ratios of air and fuel required at all loads and speeds of the engine.

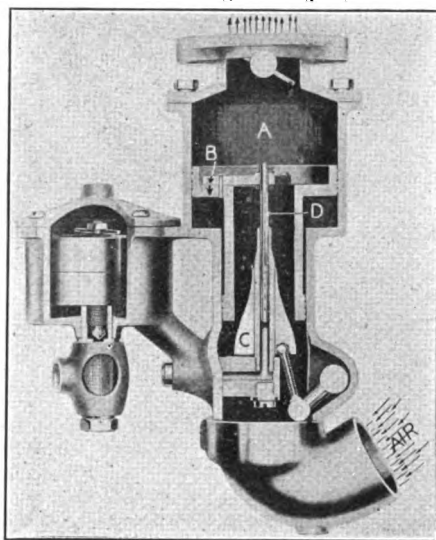
Statement is made that the velocity of air through the mixing chamber is constant at all engine speeds and does not vary from the idling to the full load. In this it differs from all other carburetors. The constant velocity of the air is obtained by the movable venturi, which is represented by the bottom of the piston (b) and the contour of the cone (c). The floating piston maintains a constant vacuum in the carburetor, which is very low (approximately one inch mercury column), this giving a very high volumetric efficiency.

Claim is made that water entering the fuel supply pipe with the fuel will not affect the functioning of the carburetor; that water may be poured into the float chamber while the engine is running without affecting its efficiency. This is explained by the low internal depression and the large orifices in the metering pin through which the water is drawn freely and quickly. This self-scouring quality removes dirt, dust or any foreign substance which would prevent the operation of other type instruments.

The proportions of air and gasoline vapor required for perfect carburetion is determined by shape of the cone and the depth of the taper grooves in the metering pin, which are very shallow when the piston is in an idling position, but increase in depth as the pin is raised by the piston. As the piston is lifted the opening around the venturi cone is in-

creased so that the shape of the cone and the graduated depth grooves in the metering pin when calibrated, the one to the other, must supply accurate volume of gasoline and air.

The design of the Booty carburetor is unusual in that it has but one adjustment, and that on the instrument board or steering post, where it can be adjusted by the driver to meet whatever conditions may be experienced. This must not be confused with a primer or choke, as it is a positive adjustment for the fuel.



Cross Section of the Booty Vacuum-Controlled Carburetor, Showing the Principles of Operation.

The object of this control is to raise the cone (c), which automatically causes the piston to rise to maintain its fixed and constant vacuum. At the same time the piston (b) is raising the metering pin (d), which increases the depth of the fuel orifices, enriching the mixture to whatever degree is desired. Claim is that any desired density of mixture constant throughout the range of the carburetor may be obtained by setting the cone. The rising of the cone will create a rich mixture for starting a cold engine, instead of choking the air by the setting of butterfly valve in air intake.

The manufacturer claims that the Booty carburetor is suited for all makes and types of engines, and that any indi-

vidual instrument will be equally efficient in use on a car, truck, tractor, aeroplane, marine or stationary engine.

MARYLAND CO. TAKES OVER WIRE WHEEL PRODUCT.

The Maryland Pressed Steel Co., Baltimore and Hagerstown, Md., has taken over the manufacture and sale of National and Pasco wire wheels, the product of the National Wire Wheel Works, Inc., through an exclusive license agreement covering a long term of years. Heretofore National and Pasco wheels have been made by the Maryland Pressed Steel Co. and the National Co. has conducted the selling.

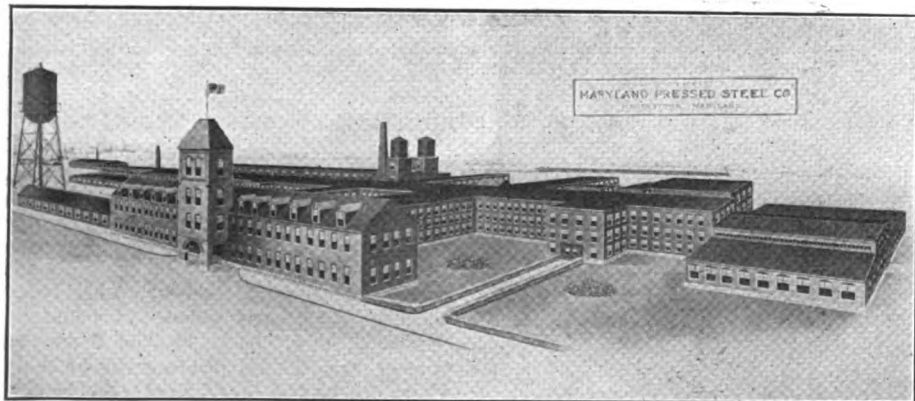
The Maryland Pressed Steel Co. is a subsidiary of the Poole Engineering & Machine Co., Baltimore, manufacturer of steel and semi-steel products for the last three generations. The Hagerstown plant affords 355,000 square feet of floor space with a minimum capacity of 1,000,000 wire wheels a year, making it one of the largest in the world. The general sales offices are to be removed from Detroit to Baltimore, and J. L. Justice will continue in charge of sales and advertising in the capacity of general sales manager.

With approximately 115 jobbers the selling organization of the Maryland Pressed Steel Co. ranks as among the strongest in the accessories industry. In Canada the wheels are distributed by the Northern Electric Co. with nine branches.

Among the exclusive features which it is claimed have contributed largely to the vogue of National and Pasco wire wheels are the device by which National wheels are locked to the hub by positive mechanical means, the standard tread of 56 inches, the same as wood wheels, and additional strength obtained through a distinctive method of spoke lacing, greater curb clearance than any other wire wheel eliminating danger of scraping or bending of spokes on the curb, equal tension of all spokes through a method of truing the rim by a special machine which practically prevents breaking or loosening spokes, a hub shell of pressed steel giving maximum strength with minimum weight, and a greater number of spokes.

"A-B-C OF FORD MOTOR REPAIRING."

Albertson & Co., Sioux City, Ia., recently issued a book entitled "The A-B-C of Ford Motor Repairing," which is somewhat unique in its idea of instructing Ford owners in the proper methods of grinding, refacing and re-seating valves and valve seats. It contains a description of the "Little Sioux" Ford tool set, with complete illustrated directions for use. These tools are exact duplicates of the larger "Sioux" tools made by Albertson & Co. for all lines of cars, trucks and tractors, but is designed exclusively for use on the Ford car or truck. The retail selling price of the "Little Sioux" tool outfit is \$7.75.



Factory of Maryland Pressed Steel Co., Hagerstown, Md., Where Pasco and National Wire Wheels Are to Be Made.

WELTMORE-SAVAGE CO.



180-2 Massachusetts Ave.,

Boston, Mass.

Wholesale Exclusively

New England Distributors of

Gould Storage Batteries, Holophane Lens, Auburn Tires, Hart Bell Pumps, F-W Automatic Windshield Cleaners, Automatic Extension Reel Lights, H & D Shock Absorbers, Ajax Jacks, Red Devil Jacks.



Gould Storage Battery

The Battery That's Basically Right

The Gould Starting Battery is basically right because the plates are right. Dreadnaught Plates are made from an exclusive Gould formula combining the high capacity of "soft" plates with the rugged long life of "hard" plates—a feature never successfully imitated. We carry Gould Batteries and Dreadnaught Plates in replacement sizes for any battery, and a full line of Battery Station Equipment.

There's a Gould Battery in the exactly right size to replace the battery on your car.

Hart-Bell Pumps

Automatically keeps leather washer in proper position, assuring perfect compression, thereby delivering maximum pressure per stroke.

Auburn Tires

APPROVED BY U. S. BUREAU OF STANDARDS

Auburn Certified Tires are on the Government approved list Nov. 4, 1918 (also Tubes and Accessories).

	Pure Para Rubber	Gov. Reqmts.	Auburn Tests
In Cushion and friction	75 to 85%		91%
Pure Para Rubber in tread	65 to 70%		80%
Tread elongated before breaking	450 to 500%		620%
Separation test between tread and breaker	28 to 32 lbs.		64 lbs.
Separation test between cushion and carcass	16 lbs.		30 lbs.

USUAL BASIS REPLACEMENT.

7,500 Miles—on Fords.

6,000 Miles—Other Sizes.

Combined with this

UNLIMITED GUARANTY.

Regardless of whether an Auburn Certified Tire has run 8,000, 10,000 or even 12,000 miles—or more—if our inspection shows an actual fault in material or workmanship as the direct reason for proper discard, a fair, honest and prompt adjustment will be made to customers who send such tires direct to us by prepaid parcel post or express.



Holophane Lens



placing a positive shield between the light and the eye of the approaching motorist.

The Holophane Fin is the greatest development ever made in headlight control.

A unique product, made by the acknowledged leaders of the world in scientific lighting. It embodies a fin or shelf of specially treated glass, which extends backward just above the bulb of the lamp,

Automatic Extension Reel Light



It takes the light exactly where it is wanted; eliminates the necessity of dragging cords over the floors, breaking the insulation and thereby increasing fire danger through short-circuiting, and SAVES cord, lamps, fuses and guards. THIS saving actually amounts to the price of the REEL in a very short time.

Actual size is nine inches in diameter by two in width. It is equipped with 25 feet of reinforced weather-proof cord. The "head" is provided with a swivel joint, enabling the lamp to be carried in any direction from the reel, while an automatic lock permits a positive stop at any desired point.

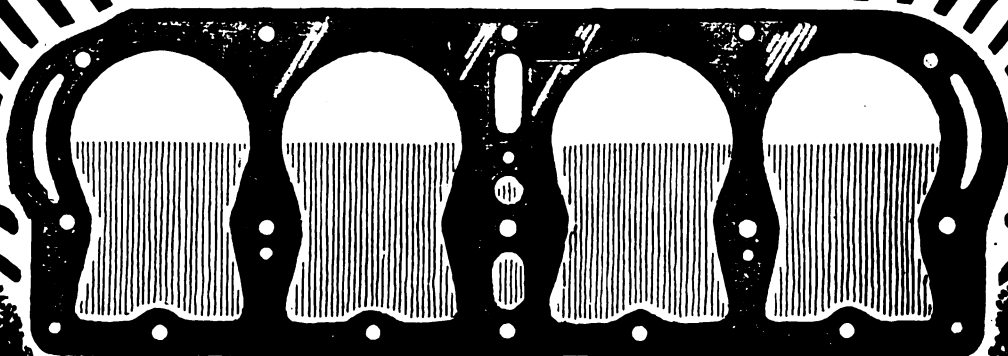
To operate—Grasp the Lamp and walk in any direction from the reel to the desired distance. It automatically locks at any joint. To release, give a slight pull on cord. This unlocks the catch and the cord is automatically rewound as the operator walks towards the reel with lamp in hand. Each reel is equipped with 25 feet of reinforced packing house cord, socket, handle and lamp guard (less globe), all complete for installing. The reel has been approved and listed as standard by the Underwriters Laboratories. Local fire preventive bureaus indorse it wherever introduced.

RED DEVIL JACKS.



Capacity 8,000 pounds. Makes cars "step sideways" or any way in a busy garage or any place where cars get blocked in a limited space; does in one swing what often requires 10 shifts to get in place or get out. It will facilitate handling cars in private garages and will roll big car in the crowded garage easily and quickly. Indispensable in unloading, in warehouses, in show rooms, in tight places, in repair and service shops, on the wash rack, putting on chains, changing tires. Indestructible crucible steel. Shipping weight 125 lbs. Range of adjustment from 8 1/4 to 15 1/2 in. Lift, 4 in.

(When Writing to Advertisers, Please Mention the Automobile Journal.)



NEVER-LEAK

CYLINDER HEAD GASKETS

STRONGEST WHERE OTHERS ARE WEAKEST

Most car owners know from experience that a gasket that will not crack, break or blowout is better than a good gasket.

None of these defects can develop with NEVER-LEAK Gaskets. Old type gaskets may cost slightly less, but you cannot afford to gamble with car service and repair bills for a few cents.

NEVER-LEAK Gaskets are metal enclosing asbestos fabric—the only type made with seamed edges, that strengthen and reinforce it 100 per cent. Every one guaranteed. We are the world's largest gasket maker. Our standard stock includes gaskets for nearly 100 cars and trucks. We produce any type to specification.

We can fill any stock order immediately. We can make delivery to schedule.

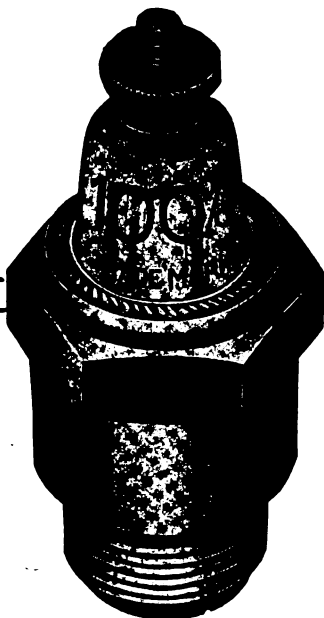
Write for Catalogue, Quotations and Discounts.

FITZGERALD MANUFACTURING CO.

TORRINGTON,

CONNECTICUT

(When Writing to Advertisers, Please Mention the Automobile Journal.)



The Furber 100% Spark Plug is guaranteed to be the best spark plug made irrespective of price.

The Furber Spark Plug is guaranteed to afford 100% insurance against all usual plug trouble.

THE FURBER 100% SPARK PLUG

A plug that is made entirely different than any other spark plug. That is why it is possible to make it scientifically right and mechanically perfect.

The insulator is placed in the shell with two gaskets, one under and the other on the top shoulders of the insulator. The flange of the shell is then turned over the shoulder of the insulator. To accomplish this evenly 210 blows of the die each with 4000 pounds pressure is applied. This pressure makes an absolutely gas-tight joint between the insulator and shell.

The average plug leaks compression.

Experience has proven that if a two-piece plug is made gas-tight that the insulator is generally broken in the operation. A one-piece plug is made by crimping in the flange by a single die at one pressure. That is the reason why in making it gas-tight the insulator becomes crushed.

The Furber 100% spark plug is produced on special machinery which is fully protected by patents. It is a riveted in plug with a permanently tight joint. Furber Spark Plug service and complete satisfaction is guaranteed wherever used. The material, workmanship and finish is in keeping with this product. It is an easy plug to clean, simple in construction, with few parts, and there is nothing to get out of order.

LIST PRICE \$1.00 ALL SIZES

JOBBER AND DEALERS. The Furber is a superior plug. Once placed, it stays sold. It will bring and hold business on merit. Our terms and discounts, backed by the right kind of advertising will make the Furber a leader with you and the best profit item in your stock.

Why Experiment with other plugs when you can sell the best at a better profit?



Furber Manufacturing Corporation

614 Washington St.,

Lynn, Mass.

Visit the Display of the
WALTHAM WATCH COMPANY

At the Boston Automobile Show

BOOTH 551-552

March 13 to 20 inclusive

Here will be shown the latest models of the Waltham Air Friction Drive Speedometer. The absolute, scientific method for instantaneously and accurately registering the speed of automobiles.

The famous Waltham Automobile Clock will be demonstrated by a large working model—most interesting.

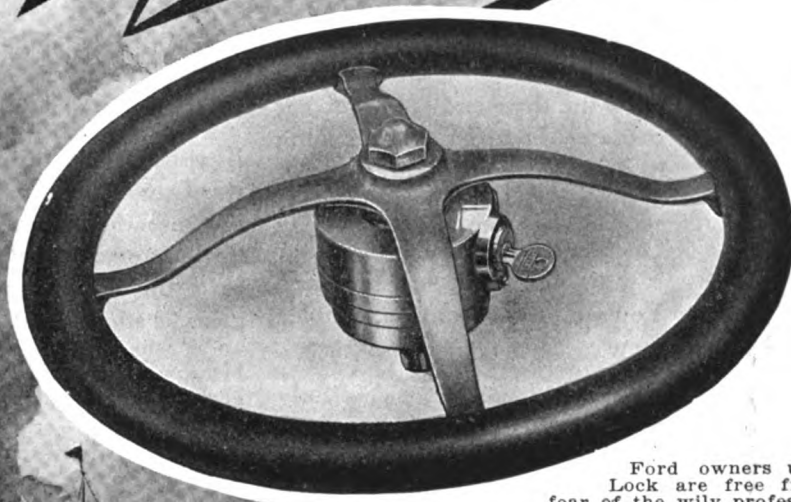
Every visitor will be welcome

WALTHAM

THE WORLD'S WATCH OVER TIME

Masters

AUTOMOTIVE ACCESSORIES



The Steal Proof Lock

Ford owners using the Steal-Proof Lock are free from the ever-present fear of the wily professional thief, the irresponsible "joy-rider" or anyone not authorized to use their car. They know the car will remain where they left it.

It is Ford insurance of the highest order and its first cost is the only cost, as it protects faithfully for the full life of the car.

The recent increase in insurance rates proves the constantly increasing theft hazard and will drive home to every Ford owner the probability of loss or serious damage to his car unless it is immediately and adequately protected.

Steal-Proof Lock

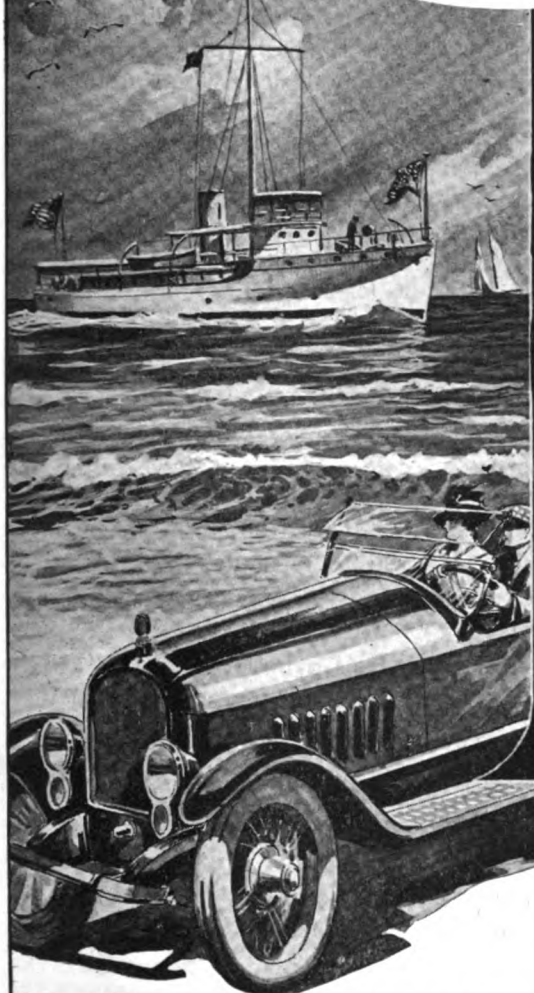
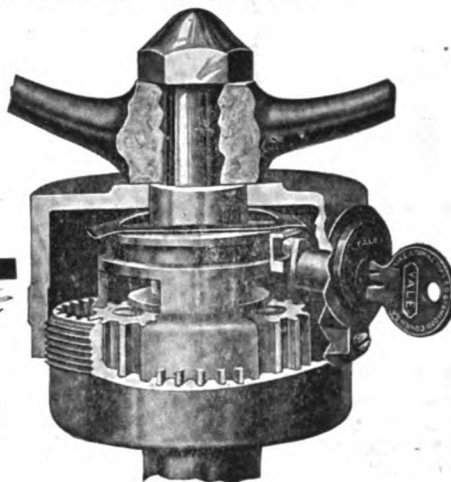
Can't lock accidentally—gravity prevents that. Locks steering wheel, steering mechanism and front wheels all rigidly together. Saves time, worry and needless expense.

Perpetual Insurance for \$8.00

So easy to apply, without special tools, that it is sold over the counter.

Liberal profits to jobbers and dealers. Send for full particulars today.

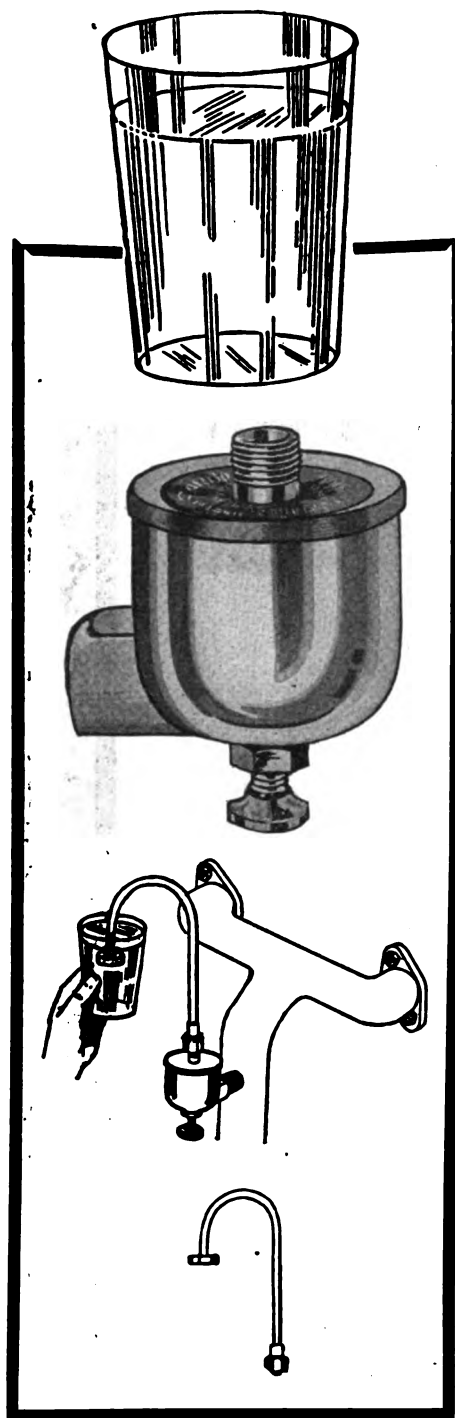
Better still, take advantage of the present demand by ordering at least a dozen NOW! You take no risk for under our money-back guarantee you can return unsold locks if you desire.



MASTERS MANUFACTURING COMPANY

68 Woolsey Square, Boston 30, Mass.

Give That Motor a Drink— And It Will Work Harder



Does carbon in your motor worry you all the time, like it does the thousands of other car owners? There's only one thing to do. Be your motor's doctor and cure it of indigestion.

Once a week, while the motor is hot, give it a glass of water. You won't have carbon troubles then.

Does your car give you only fifteen miles to the gallon of gasoline? There's twenty miles in each gallon, if you want to get it. Why not cure that motor of over-eating and get five miles more!

Equip your intake manifold with a Re-Carbureter. Test it for 30 days. If you do not find it will do all we claim for it, return the Re-Carbureter and we'll refund the \$5.00 you paid for it.

This is the way to banish carbon. With a squirt can, put water in the Re-Carbureter intake. Let the hot motor suck in the water. The steam breaks up into oxygen. Pure oxygen eats up carbon on pistons, cyl-

inder heads and rings, with ease. The motor works better than ever after its drink.

If you prefer, the Re-Carbureter Oxy-Generator, which fits the threaded intake of the Re-Carbureter and allows you to feed the water from a cup or glass, is supplied at \$1.00.

How you save the five or more miles usually wasted in every gallon of fuel.

The Re-Carbureter re-mixes the gas before feeding the engine. The Re-Carbureter is controlled automatically by the motor. It feeds only what the motor can convert into power.

Without the Re-Carbureter you feed the motor too much. The surplus makes carbon. Some of it leaks into the oil pan and dilutes your lubricant.

There is a third value to the Re-Carbureter. It is an excellent primer when the motor is cold. Squirt a few drops of gasoline or gas and ether into the Re-Carbureter. The motor will fire instantly.

Write for more information. Or better still, place your order now. Our Written guarantee protects you.

Dealers will find the Universal Re-Carbureter a profitable accessory. Get in touch with our proposition.

THOMAS-ARMSTRONG CO., INC.

1777 Broadway, New York City

**UNIVERSAL
AUTOMATIC**

**RE-CARBURETER AND
PRIMER**

FOR PLEASURE CARS, MOTOR TRUCKS AND TRACTORS



For Every Motor Necessity

Look for Our Booth—Space F561
—at the Boston Automobile Show
where Our New Tools will be
Exhibited.

WALDEN-WORCESTER
(INCORPORATED)

GENERAL OFFICES AND FACTORIES
WORCESTER, MASS.

CHICAGO
452 Monadnock Building

NEW YORK
295 Broadway

SAN FRANCISCO
467 Monadnock Building

(When Writing to Advertisers, Please Mention the Automobile Journal.)

AT LAST!

A Positive Check Up On Mileage Per Gallon of Gasoline

The average owner operates his car on a "hit or miss" cost basis, sometimes getting 15 miles to a gallon of gasoline, sometimes 10. The Vacuumeter—"a gasoline mileage meter"—is the only device which eliminates guesswork regarding the miles per gallon. It tells unfailingly how much gasoline is used per mile, how many gallons have been used per season and how many gallons remain in the tank.

If your carburetor is improperly adjusted, if your motor is full of carbon or if your ignition is weak, the mileage per gallon drops immediately. The Vacuumeter will enable you to detect these conditions long before they would become noticeable otherwise, because the instant your motor requires more gasoline to cover the same mileage the Vacuumeter shows it in plain figures. It acts as a watchdog on your car's performance.

It is simple in operation and can be quickly installed on any car using vacuum gasoline feed. No gasoline passes through the Vacuumeter.



Price

\$18⁵⁰

VACUUMETER SALES CORPORATION
KNOXVILLE **TENNESSEE**

VACUUMETER SELLING CO.
Eastern Distributors*
Philadelphia, Penna.

ENGINEERING SALES CO.
Dollar Bank Bldg.
Youngstown, Ohio

THE THOMAS-BRAY CO.
Provident Bank Building,
Cincinnati, Ohio

Vacuumeter

"A Gasoline Mileage Meter"

TRADE OUTLET

TIRES

JOB LOTS

Obsolete, Surplus Stocks and
Factory Seconds

WRITE—CALL

BROADWAY TIRE JOBBERS

250 West 54th Street

New York

TIRES AND TUBES

Demonstrating and Factory Repaired.
Economy, Quality, Price. All
Standard Makes.

Size	Tires	Tubes	Size	Tires	Tubes
30x3	\$5.00	\$1.85	36x4	\$9.00	\$1.75
30x3 1/2	6.00	1.45	34x4 1/2	9.25	1.75
32x3 1/2	6.50	1.50	36x4 1/4	8.00	1.00
31x4	7.25	1.65	36x4 1/4	8.75	1.05
32x4	8.00	1.60	35x5	10.50	2.00
33x4	8.75	1.70	37x5	11.00	2.25
34x4	8.75	1.70			



Write for Prices on Odd Sized Tires. TERMS:
\$1.00 deposit with each tire ordered, balance C.
O. D. subject to inspection. Specify style of
rim to avoid delay. Although used tires are not
guaranteed for any definite number of miles,
we guarantee our tires to give the best
service in proportion to the prices paid, or rea-
sonable adjustments are made.
LIBERTY TIRE CO., 2119 So. Michigan
Ave., Dept. I, Chicago, Ill.

AUTO PARTS.

50% to 90% OFF List.

24 Hour Service. Unlimited Stock.
Pope-Hartford, Columbia, Reo,
Overland and 200 other makes.

Motors, \$20.00 up | E. Presto Tanks, \$4.00
Magneton, \$3.50 up | E. Presto Tanks, \$4.75
Cylinders, \$3.00 up | Bearings, 50c up
Springs, \$1.00 up | Rims, \$1.00 up

1000 Other PARTS Bargains.

If you want any part not listed here,
Write Us—We Have It.

Conn. Auto Parts Co., Inc.

18-20 Morgan St., Hartford, Conn.

Atwater-Kent Sales Co., of New England

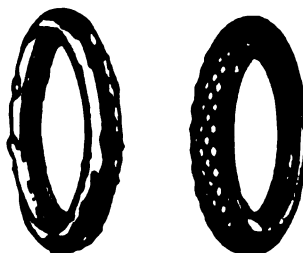
883 BOYLSTON ST., BOSTON, MASS.

Official
SALES AND SERVICE
For New England.

Complete stock of parts always
on hand.

Write for Price List.

BOSTON RETREAD TIRE CO.



Before

After

OUR METHOD OF RETREADING IS
DIFFERENT FROM OTHERS.

We use all Goodyear first quality stock
and retread bands and can absolutely
guarantee from

3000 to 3500 Miles.

We will replace a new tire for every
one that our work does not give satis-
faction.

Tires called for and delivered. We pay
express charges one way on all out-of-
town orders.

Price List Mailed Upon Request.

BOSTON RETREAD TIRE CO.

78 Clarendon St., Boston, Mass.

Auto Mailing Lists

Send for our free complete Price List
covering Auto Dealers, Owners, Ford
Dealers, Truck Dealers and Owners,
Garages, Auto Mfrs. and etc., any state.
A. F. WILLIAMS, Mgr. of List Dept.
168 W. Adams St., Chicago, Franklin 1183.

AUTO PARTS—At Your Own Prices.
We can supply parts for nearly every
make of car. 648 Packards, Interstate
Fours, also Truck parts, GMC and
other makes.

Write us for Parts. We have them.

STRANDWAY AUTO PARTS CO.,
193-195 H. St., South Boston, Mass.

SPEED OR POWER FOR THE FORD.

Install a set of:

2 1/2 —1 Gears in the Racy Type

3 —1 Gears in the Roadster

4 —1 Gears in the Delivery

Our Trade Mark—A star on every gear
insures quality.

DETROIT RADIATOR & SPECIALTY
CO., 968 Woodward Ave., Detroit, Mich.

AUTO SAVE 50-90% PARTS FOR 400 CARS

POPE, PACKARDS, PIERCE, BUICK,
STEVENS-DURYEA, KNOX, OVER-
LAND, ETC.

Motors, \$25.00 up | Presto Tanks, \$4.50 up
Magneton, 4.00 up | New Spotlights, 2.00 up
Carburetors, 3.00 up | Generators, 10.00 up
Rear Axles, 15.00 up | Gears, 1.00 up
Front Axles, 5.00 up | Bearings, 1.00 up
Cylinders, 5.00 up | Radiators, 10.00 up

\$12 Diamond Bumpers.....\$5.50

Jobbers in Bankrupt Auto Supplies.

BRIGHTMAN AUTO EXCHANGE

321 Windsor Ave., Hartford, Conn.

SALESMEN AND DEALERS—A million
Ford owners are waiting for you to
show them the only safety steering at-
tachment; takes that jerk out of the
Ford steering wheel and makes it steer
like a Packard; pays for itself in tire
saving; put it on your car and dozens
want it; if you have small capital and
can put canvassers out to sell the own-
ers, selling yourself to the trade, you
can make a small fortune. Write to-
day. Saxton Auto Accessory Co., Inc.,
347 Fifth Ave., New York City.

—CLASSIFIED ADVERTISING PAYS—

Advertise the bargains that you have
to offer.

8000 Buyers Read MOTOR TRUCK.

(When Writing to Advertisers, Please Mention the Automobile Journal.)

TRADE OUTLET

At 304
**Columbus Ave.
For K-E-E-P-S**
304

Selling Slightly Used Tires. The Largest Stock in the East. "Your Money's Worth or We Make Good." Remember Our Prices Will Interest You.

Size	Tires	Size	Tires
30x3	\$4.50 down to \$2.40	33x4½	\$12.00 down to \$6.00
30x3½	6.50 down to 3.40	33x5	14.50 down to 8.00
32x3½	8.75 down to 3.90	35x4	10.50 down to 9.00
31x4	8.00 down to 4.00	34x4½	10.00 down to 6.00
32x4	8.25 down to 5.00	35x4½	12.00 down to 6.50
33x4	9.00 down to 5.50	36x4½	12.00 down to 6.00
34x4	10.75 down to 6.00	35x5	25.00 down to 6.90
32x4½	12.00 down to 7.00	36x5	12.00 down to 8.00
		37x5	14.00 down to 6.00

USED TUBES, ALL SIZES, AT \$1.50 TO \$2

MAIL ORDERS given prompt attention. Tires sent C. O. D. with privilege of examination. 5% discount if cash or money order comes with order.

BOSTON AUTO TIRE EXCHANGE
304 COLUMBUS AVE. TEL. B. B. 7329

Magneto Repairs

Skillfully Done. Assured Satisfaction. Prompt Service.

The repair work turned out of this shop is of the highest merit—because I know how. If you have electrical and magneto troubles, no matter whether it is a

BOSCH, SPLITDORF-EISEMANN, or any other make, I can fix them. My well-appointed plant, coupled with skilled workmen, assures you of expert magneto service. Send in your magneto. 24-hour shipment.

Rebuilt Magnetos, Platinum Parts, Generator Brushes, Bearings, Etc.

Correspondence Invited.

The Magneto Shop

JOHN BRUNSWICK,

187 Massachusetts Ave., Boston, Mass.

Magneto and Generator Exchange of N. E.

44 COLUMBUS AVENUE, BOSTON, MASS.

SAVE 50%

Offers

Quality Service for your car.

Starting, Lighting, Ignition.

One year guarantee on repairs and installations of all makes.

Everything pertaining to Auto, Electricity, Magneto and Generator Parts. We have one of the best equipped shops in New England devoted exclusively to this work.

BOSCH, SPLITDORF, EISEMANN, DIXIE, BERLING MAGNETOS
and Parts Always in Stock.



Every Ford owner should read "Transforming the Ford." Tells how to secure smooth, positive brake action that no car can excel. A little "transforming" and your car will glide to a quick, quiet stop without the annoying, irritating clatter that you now experience. It will go into low or reverse without jumping or jerking, and you can pick up speed with all the smoothness and ease of a high-priced car. All accomplished without additional expense and the result is a clear saving of 75 per cent. in one direction alone. "Transforming the Ford" tells how it's done. Send for your copy this very minute. 10c stamps or coin. **CORMACK CO., Dept. 57, 500 Fifth Ave., New York City.**

Tires Guaranteed 5000 Miles

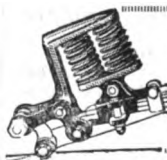
30x3 plain	\$8.00
Non-Skid	\$10.00
30x3½ plain	\$11.00
Non-Skid	\$13.50

Big saving on other sizes and tubes also. Trade in your old tires. 20% deposit required on C. O. D. orders.

Write for lists to

M. Liben & Co.

793 J 7th Ave., New York City.



"CHAMPION" Shock Absorbers for Ford cars. Write for our price. Special offer. **Champion Shock Absorber Sales Co., 918 N. Senate Ave., Indianapolis, Ind.**

SALESMEN to sell first class Air Pump to garages in New York and adjoining cities. Address **Piston, Accessory & Garage Journal.**

JACKSON PARTS ALL YEARS and MODELS

Prompt and Satisfactory Service
Guaranteed.

Jackson Motor Service Co.
Brighton District, Boston, Mass.



BOSTON'S Finest Equipped Auto Electric Repair Service

With a staff of trained electrical men we can offer auto owners expert service, coupled with promptness and personal attention to all electrical repair problems. We also repair any electrical equipment used on a motor car. Official service and parts representative for

**AUTO-LITE LIGHTING AND
STARTING SYSTEMS.**
Complete Stock of
GENUINE PARTS.

All Work and Parts Guaranteed.

William H. Flaherty Co.

74 CUMMINGTON ST., BOSTON, MASS.

(When Writing to Advertisers, Please Mention the Automobile Journal.)

ANNOUNCEMENT

To Introduce the Celebrated BANCROFT PROCESS TIRES 6000 Miles Guarantee NON-SKID

To the readers of the Automobile Journal, we are offering for a limited time only the following prices:

FABRICS Guaranteed 6,000 miles.		CORDS, 8,000 miles.	
30x3	\$9.99	No Cords	
30x3½	11.80	No Cords	
32x3½	14.50		\$16.63
34x3½	15.00		18.66
31x4	16.25		19.43
32x4	17.57		20.27
33x4	18.99		21.24
34x4	21.00		22.85
35x4	22.65		25.71
32x4½	23.00		26.89
33x4½	24.97		27.97
34x4½	24.60		28.70
35x4½	25.80		29.90
36x4½	26.49		30.63
37x4½	27.38		31.02
33x5	28.78	No Cords	
35x5	29.99		33.03
35x5	30.97		35.50
37x5	31.77		37.03

Our tires contain six layers of 14 oz. Sea Island Duck; with one exception, the only tire on the market containing that many layers.

Our adjustments are made as follows:

Should your tire run 1000 miles and give out through no fault of yours, by paying us 20% of the purchase price we shall furnish you with a new Bancroft Process Tire.

If it runs two thousand miles, you pay us	40%
If it runs three thousand miles, you pay us	50%
If it runs four thousand miles, you pay us	60%
If it runs five thousand miles you pay us	80%
On the CORDS the adjustment is made on a 15% basis.	

OUR MONEY BACK GUARANTEE

If upon receipt you are not satisfied we will return your money. Send check, post office or express money order to

BANCROFT TIRE COMPANY

505 FIDELITY BUILDING

PORTLAND, MAINE

HUMOROUS SIDE OF MOTORING

NOT EXTRAVAGANT.

They were just married, and were making up a budget for the new year.

"John, dear," she said, "here is a lovely motor car we might get."

"What is the price?" he asked.

"Only \$2000?"

The young husband lapsed into deep thought and the bride said, rather nervously:

"Do you think it extravagant?"

"Oh, no," he replied slowly. "I was only wondering what to do with the remaining \$500 of my salary."

WHAT THEY DESERVE.

"And where do the joy riders go when they die; can any of you children tell me?" asked the Sunday school teacher.

"Yes'm," replied Johnnie, who lives in an automobile town. "They go where they need asbestos brake linings."

BREAK NECK SPEED.

His car had collided with a telegraph pole. A crowd gathered round.

"I think my collar bene is broken," he said to the policeman who bent over him.

"If that's all yer in luck," growled the officer. "Sure 'twis break neck speed ye was goin' at."

AIR-OR-NOTS?

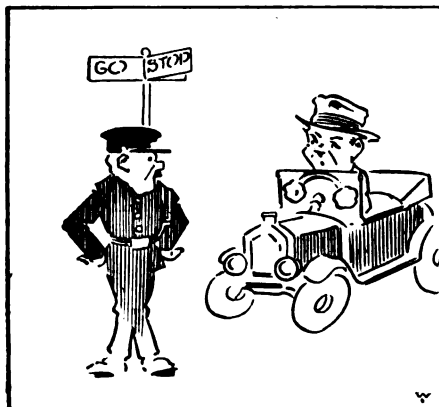
"Why do they call us aeronauts?"

"Because, when air planes were first invented, they didn't know whether they would stick in the air or not! But the name stuck."—Manitoba Free Press.

WILLING TO PAY TO LEARN.

Traffic Officer—When I signal you to stop, I want you to stop. The next time it will cost you a fine!

Autoist—Say, brother, if you can show me how to stop this sheet-iron lizzard any quicker than I did, I'll give you 10!—Cartoons Magazine.



MOTORIZED PROVERBS.

Speed not, pay not.

Small car, soon cleaned.

A repair in time saves dollars.

Too many tinkers spoil the car.

Spare the oil and spoil the auto.

The pedestrian loveth a considerate driver.

A whole skin is better than a speed record.

The motorist detesteth persistent knocks.

Do not count on your auto before it is delivered.

A spare tire in the car is worth 10 at the garage.

One good turn will not always start the engine.

The reckless driver goes oftenest to the repair station.

A stung autoist shuns the short-measure filling station.

An ounce of prevention is worth a pound of hospital bills.

The wise man does not put all his dollars into an automobile.

Take care of your car and your dollars will not need a guardian.

Make hay while the traffic officer is shining up to the other fellow.

The farthest way around is the nearest way home when the bridges are down.

You may drive your car to the water, but you will have to fill the radiator yourself.

Those who ride in limousines should not cast supercilious glances on those who go by in flivvers.

WHERE IT HIT?

Judge—Where did the automobile hit you?

Rastus—Well, judge, if I'd been carrying a license number it would hab been busted to a thousand pieces.



WHEN THE GASOLINE GIVES OUT.

There's a sort o' grim despair,
There's an Atlas-weight o' care,
There's no scenery that's fair,
When the gasoline gives out!

When the chug o' engine dies,
What, O what are cloudless skies?
What's the use o' lookin' wise,
When the gasoline gives out?

"Presto change!" your autoist,
Who thought all the world sun-kissed,
Becomes gloomy pessimist
When the gasoline gives out!

What to him is palace fair?
Life to him is carking care!
Gasoline station all that's fair?
When the gasoline gives out!

BEARDING THE LION.

The whole police department at Richmond, Va., aided by city detectives and state prohibition agents, is looking diligently for the motor car of Sheriff Webb Sydnor, which was stolen from in front of the capitol building while he was inside getting his 1920 license tag.

QUITE AN INDUCEMENT.

A motor bus goes through the outlying districts of Hemet, Cal., every Sunday morning, offering a free ride to any one who will attend the service at the Methodist church.

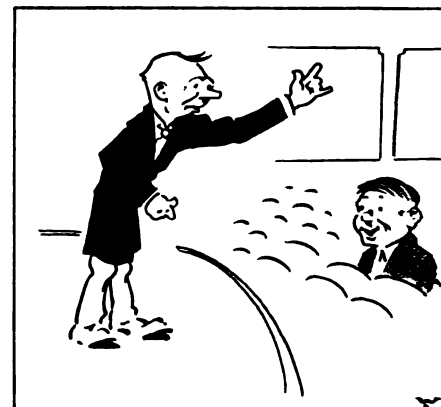
SOME CROP.

The value of the Vermont apple crop last year is estimated to have been at least 2000 automobiles.

HE'D PAID A FINE.


The Orator—What is the price of liberty? Again, I ask you, what is the price of liberty?

The Automobilist—Five dollars for the first offense \$25 for the second offense



We Exhibit at the Boston Show Space 613 Dept. C


Service Display of

CONNECTICUT

PRODUCTS
 Ignition Parts, Lighting Switches
 Automatic Switches

NOTE

Factory Representatives
 Will Be In Attendance
 To Answer Service Questions.

Service Display of


BASCO
 Switches—Pancs—Cutouts
 Current Regulators

SEE

Connecticut Ignition For Ford Cars

**Eliminates the Dash Coil and Old Ford Timer
 Increases Efficiency of Ford Motor**

Garage Telephone

**A low price but Extra-fine Telephone System. Will save many
 steps a day and will pay for itself in no time
 See This Step Saver in Operation at the Show**


Service Representative for
 Connecticut Tel. & El.
 Briggs & Stratton Co.

V. A. NIELSEN CO.

708 Beacon St.

Boston, Mass.

Manufacturers' Agents
 India Ignition and Light-
 ing Cables, Connecticut In-
 terior Telephones.





DIXON'S
 GRAPHITE
 Transmission and Differential
LUBRICANT

You get more miles, smoother miles, faster miles, easier miles, less-wearing miles, more economical miles with this Dixon Lubricant in your transmission and differential.

Write for Booklet No. 210-G.
 Also ask your dealer about Dixon's famous Cup Grease.

Made in Jersey City, N. J. by the
JOSEPH DIXON CRUCIBLE COMPANY
 Established 1827

GRANT
SIX

*A happy combination of dignity, style
 and practical economy*

GRANT MOTOR CAR CORPORATION,
 Cleveland.

DOVER
Electric Light Bulb Cases



Pat. Nov. 23, 1915.
 Carries 5 extra Lamps in a small seamless Steel Box, securely held in place by steel springs.



Pat. May 22, 1917.
 Carries 2 extra Lamps in a small steel cylindrical tube. Bulbs carried in either style of above cases guaranteed against breakage.

Send for Catalog.

DOVER STAMPING & MFG. CO.
 385 Putnam Ave., Cor. Pleasant St., CAMBRIDGE, MASS., U.S.A.



(When Writing to Advertisers, Please Mention the Automobile Journal.)

Practical Hints on Vulcanization and Repair of Tires

(Compiled by the Goodyear Tire & Rubber Co.)

CAUSES OF IMPERFECT TREAD CURE IN THIRD CIRCLE MOLD.

Due to the fact that the construction of one-third circle retreaders is made variable in size of cavity, repair men have difficulty in using them. Where the casing size is found to be smaller than the actual size of the retreader it has resulted in many cases in a lump being formed on the tread surface of the casing at the point of the vulcanizer ends. In these instances where the casing size was slightly larger than the cavity which was used it resulted in a depression being formed at this point.

In figure 1 the cause of the bulge in the cure and the method of preventing it is clearly shown. It is merely a mat-

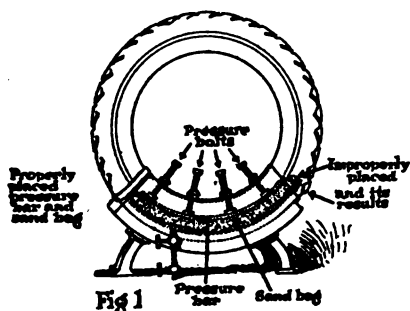


Fig 1

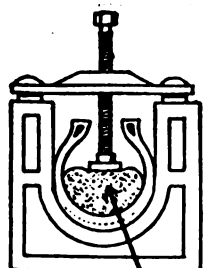


Fig. 2



Fig 3

ter of proper application of the sand bags in the cavity. Figure 2 shows a cross section of the casing in the cavity with the sand bag properly fitted and the clamp in place. The bag in this illustration is in proper position to insure right tread line pressure. Figure 3 shows the pressure bar bent by continuous use, the dents in the bar resulting from the improper application of the sand bag, and they cause flat spots and an imperfect cure on the tread.

CAUSES OF TREADS SINKING.

A middle western tire shop sends this query: "What is the cause of sinking of the tread at the intersection or between the diamonds, when exposed to heat? How can I stop it?"

Blisters—rising up and contracting—cause this condition through stretching the rubber. Remedy the blisters or air pockets and the problem is solved.

Take Proper Care of Air Bags

D. R. CAIN, instructor in the Goodyear tire repair school, says: "Treat air bags right and they will last long enough to make proportionate cost per repair very moderate. I have noticed in some shops that after a bag has been used it is thrown under the bench, deflated, until needed again. This flattens the bag out and later the lining is likely to crack where the crease comes. Air bags when not in use should be inflated sufficiently to round them out.

"After a bag has been used a number of times it becomes more or less elongated. When this occurs a semi-circular fabric pad should be employed to relieve the internal strain on the bag. This pad should be placed on top of the bag, i. e., against the tread."

When Repairs Loosen.

"What is the matter," asks a repair man, "when the new work pulls away from the tread? It looks just as good at first as any part of the tire—smooth and even—but after a couple of weeks running it comes loose from the old tire."

There might be almost as many causes of this trouble as there are operations in the process of making a repair. On this account it is difficult to diagnose the ailment at long range.

One likely explanation, however, is lack of "follow-up" pressure. If the equipment used is provided with clamps and wood blocks the original tightening of the clamps will not suffice throughout the period of vulcanizing. As the gum softens and begins to flow out the pressure naturally decreases and unless the clamps are tightened up, say every 15 minutes, the rubber will become spongy and the difficulty described might well be the result.

Of course if an air bag is used the necessary follow-up pressure is automatically supplied.

Insufficient buffing is another common cause of repairs loosening. Tread rubber is very tough and thorough buffing is essential to produce the fine pores on the surface of the stock that will allow the cement to work in and form a firm union. A power driven wire brush is much more effective for this purpose than sandpaper or a rasp.

If too much stock is used the excess will flow over the old tread where it is not buffed, or cemented. The tread stock will begin to peel back along the edges, with the probability that in time the entire tire section will be loosened.

New Wrinkle in Tube Repairing.

From a repair man in California comes this suggestion:

"In repairing tubes we often have some with the puncture near the valve base or in the joint where the tube unites, and difficulty is experienced in making the

patch cook down evenly all around. To overcome the trouble we use a small bag, such as a tobacco bag, with a little fine sand in it. By placing the bag on the tube over the patch and then the block on the bag, an even pressure on the tube is insured, the sand adjusting itself to the thickness all around."

This is really an excellent idea, but we think we know a method that represents an improvement over it. That is to use a rubber block instead of the wood block and sand bag. The rubber block should be about three-quarters of an inch thick. It may be cut out of an old solid tire or built up of layers of tread stock (G-100). A shallow tin box of the right size can be made to serve as a mold. Cure on the flat plate for about 40 minutes at 60 pounds steam pressure. When the block gets hard from repeated vulcanization it should be discarded.

Remember.

There are three vital elements in vulcanizing—time, pressure and heat. If anyone of these is wrong there will be something lacking in the finished job.

DEVICE FOR PULLING BEAD MOLDS FROM SECTIONAL VULCANIZERS.

Instead of using a hammer to remove bead molds from sectional vulcanizers, and battering the molds in the process, if the device shown in the illustration is used, the bead molds can be removed with a minimum of time and labor. The new tool which can be made in any blacksmith shop consists of a three-foot bar of iron either round or square dimensions, one inch wide and $\frac{1}{2}$ inch thick, with a hole bored through the wide dimension 10 inches from one end. The bar should be slightly bent with the concave or "dished" side up. At the end from which the measurement was taken to bore the hole, a flat 10-inch bar of the same size iron is welded, with small fillets to stand the strain of a pull. In the hole in the



Detailed Sketch of the Tool.

main bar is attached a blunt hook and a stout chain—the total length of which is six inches.

To use, place the cross bar on top of the vulcanizer, set on the lugs and place the hook under the bead molds at the end of the section and lift up. The beads should then give no further trouble about coming out.

Classed as an expert in pneumatics, Josef Hofmann, the celebrated pianist, is the inventor of a shock absorber which has been patented in Europe.



Monthly

20c the Copy

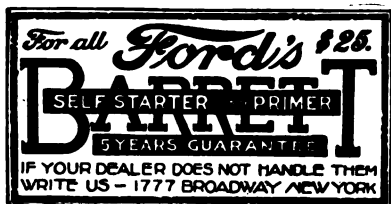
\$2 the Year



A Tractor Journal
devoted to the
tractor industry and trade



Published by
The Automobile Journal Publishing Company
PAWTUCKET, RHODE ISLAND



Giant Searchlight

The highest quality lowest priced
lamp produced.

LIST PRICE With Mirror.....\$6.00
Without Mirror...\$5.00

CULVER-STEARN'S MFG. CO.

Worcester, Mass.
Detroit, Mich.

The Automobile Journal

A QUALITY MAGAZINE, WITH PRESTIGE AND CIRCULATION THAT BRINGS RESULTS TO ADVERTISERS

TIMES BUILDING :: PAWTUCKET, R. I.

Polarine



It's Easy to Start a Polarined Motor

Polarine Oil does not clog bearings, and is friction insurance, too. Keeps a protecting oil cushion between moving parts and in snug-fitting bearings—absorbs the hammer blows of the piston strokes without severe vibration and knocks, and prevents metal-to-metal friction.

It also maintains a fuel and gas-tight seal between piston rings and cylinder walls that guarantees maximum power with fuel economy the year round.

Buy *Polarine* Oil for your engine and *Polarine* Gear Oil for your transmission and differential gears where you buy uniform, power-full *Socony* Motor Gasoline—where you see the red, white and blue Socony Sign.



Standard Oil Co. of New York
Principal Offices

New York
Albany

Buffalo
Boston

The sign of a reliable dealer and the world's best Gasoline



American Cars Popular in Chile

It is stated by a bulletin recently issued by the Latin-American division of the United States Bureau of Foreign and Domestic Commerce that American automobiles have become remarkably popular in Chile during the last five years. This has not been wholly due to the elimination of European sources of supply during the war period, but largely the result of a growing familiarity with the conveniences of motor driving combined with the discovery that these advantages are possible for people of moderate means through the comparatively low prices of certain American cars. And, moreover, the high grade American makes have been demonstrated with success to the class of Chileans that can afford expensive machines. In the social life of the cities the motor car has become an essential, replacing the family coach or carriage, it is said.

Outside of the cities the lack of good roads in Chile seriously affects the use of automobiles, for two mountain chains extend the 2500 miles of the country's entire length and in the mountainous regions road construction is a problem. Between the mountain ridges are level areas, but even here the scarcity of good roads prevents much touring.

War restrictions on the manufacture and shipment of automobiles reduced the exports of cars from the United States to Chile in 1919 to one-third the number and less than one-half the value of the cars shipped in 1918. The largest item in this trade in 1919 was passenger cars, and the second automobile tires. The second item was the only one that did not fall off in the 1919 period; on the contrary, imports of tires increased about 50 per cent. The roads of Chile are specially severe on tires, and this explains why shipments of tires to that country show such a tremendous increase in the period from 1913 to 1919. Exports of motor trucks, the number of which had increased over 300 per cent. in 1918, dropped about 30 per cent. in 1919, but indicated a rapidly growing tendency toward the adoption of motor freight transportation. While imports of motorcycles and automobile parts in 1919 showed slight declines from the 1918 figures, they were much larger than in any other previous year.

Shipments of automobiles from the United States to Chile have represented practically all of Chile's trade in this line since 1916, but the United States' share of this business in 1913, the last pre-war year, was but little more than eight per cent.

NEW CAR DESIGNED EXCLUSIVELY FOR FOREIGN TRADE.

American Motors, Inc., is manufacturing a new car designed exclusively for foreign trade, to comply with existing conditions abroad. The maker claims for this product that it breaks away from the former practise of American automobile manufacturers who have made no particular effort to meet actual conditions abroad, but have built up their export trade on their ability to undersell the market.

None of the cars will be held in the home market, the manufacturer claims, and thus the foreign purchaser will be enabled to get the car that meets his requirements at a lower cost than would be possible if the car were bought in his own country. In the design of the car American Motors claims to have chosen only the best features of the standard American cars.

RAINIER TRUCKS IN INDIA.

The New York Overseas Co. has recently shipped to India 50 Rainier worm-driven delivery trucks, made by the Rainier Motor Corporation, Flushing, Long Island, N. Y., the last shipment including two for Bombay and six for Calcutta.

In some sections of that country the automobile is rapidly supplanting elephants, which have for centuries been one of the principal means of transportation.

DUTCH EAST INDIES.

Among the principal articles listed as demanded and imported into the Dutch East Indies are low-priced motor cars and accessories. Export restrictions on these have generally been lifted.

A new chamber of commerce for the Netherlands and the Netherlands East and West Indies is being organized to further the trade between these countries and the United States.

Exports of manufactures from United States in 1919 were \$10,000,000 a day.

Small Cars Preferred in Japan

In Japan it is reported that small or medium types of passenger cars are preferred, as the narrow streets and congested traffic place a large car at considerable disadvantage. Closed cars are preferred, especially for private use, on account of the dust in the streets and also because the Japanese women do not wear hats, and their carefully arranged coiffures suffer considerably in open cars. A closed car also offers a better means of crowding in an extraordinary number of passengers without attracting undesirable attention. An imported chassis is often fitted with a Japanese made body in order that the seats may be of the size and height most suitable to the Japanese, and also to provide seating arrangements for a larger number of passengers than is usual for cars of the same make in the United States. In general cars of types suited for city use in the United States are suited for the Japanese market. There is, however, a demand for automobiles at mountain summer resorts where engine power and safety of control are the chief requisites.

MARKET IN THE PHILIPPINE ISLANDS.

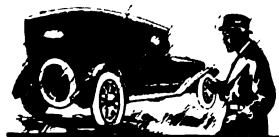
American motor vehicles continue to predominate in the Philippine market. In 1918, 4318 passenger cars with a total capacity of 22,817 were registered. The five-passenger car is the most popular, according to the registration figures, with a total of 2153 cars, while seven-passenger cars stand second with 1171 registrations. Two-passenger cars total 459, four-passenger cars 181, eight-passenger cars 108, three-passenger cars 107, six-passenger cars 94, 10-passenger cars 37, and nine-passenger cars 16.

The total number of trucks registered in 1918 was 567, with a tonnage capacity of 1052 and a passenger capacity of 6345. Due to the lack of railroads and the need to transport agricultural products, motor trucks are beginning to play an important part in the country's commerce.

DEMAND FOR CARS IN SWEDEN.

The present demand for automobiles in Sweden is 300 per cent. greater than that prevailing in 1914.

What motorists dread most—



EVERY time you get out on the road—every time you are out in a storm—you worry for fear you

will have a puncture, or two punctures, if you carry a spare. You dread the fuss and bother of fixing a tire. And out on the road you must do it yourself. Your trips often are spoiled by this fear, are they not? But if you have a LAWCO Rim Tool in your tool box you go anywhere, any time—any weather—and enjoy every minute of the drive, because you know that you can fix a puncture in a few seconds. The LAWCO Rim Tool enables you to take any split rim—any size—out of a tire in less than one minute! The hardest part of fixing a tire is made almost a pleasure.

Ask your dealer for the LAWCO Rim Tool. If it doesn't please you, he will refund your money without a question. If he can't supply you, then write us, sending his name.

THE F. H. LAWSON CO.
Dept. E.
Cincinnati, Ohio.



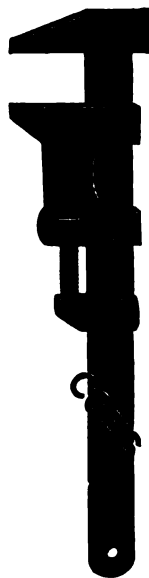
LAWCO RIM TOOL

NEW DEPARTURE BALL BEARINGS

Strength
Stamina
Service

The New Departure Manufacturing Co., Bristol, Conn.
Conrad Patent Licensee

COES The Standard WRENCH



WRENCHES that are made for the hardest service. They do not break but grip and hold and their efficiency never lessens.

Economy tools as they last longer, give better service and never become useless through wear.

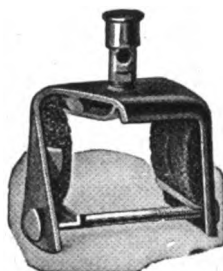
Utility wrenches of the highest order for car owners and repairers as they can be used in compact places and once set hold like a vise.

*The Best Wrench
The Cheapest*

All dealers carry in stock the exact size to meet your need. They recommend Coes Wrenches as all good dealers have for more than fifty years.

COES WRENCH COMPANY
WORCESTER, MASS.

ENJOY SMOOTH RIDING



by keeping your springs lubricated. Brown Oilers automatically filter oil between spring leaves, eliminate rust, stop squeaks and give you solid comfort.

Easily applied. Ask your dealer. Set of 8 oilers, \$10. Money back guarantee.

BROWN SPRING OILER CO.,
6913 Carnegie Ave., Cleveland, O.

Tarvia PREVENTS DUST PRESERVES ROADS

Booklets on Request

THE BARRETT COMPANY

New York Chicago Philadelphia Boston
St. Louis Cleveland Cincinnati
Pittsburgh Detroit Birmingham Kansas
City Minneapolis Nashville Salt
Lake City Seattle Peoria



PAIGE

The Most Beautiful Car in America

A complete line
of touring and
enclosed models.

Write for Literature.

Paige-Detroit Motor Car Co.

DETROIT, MICH.

(When Writing to Advertisers, Please Mention the Automobile Journal.)

Signs for Safe-Guarding Grade Crossings

IN CONFORMITY to the campaign for a better and more uniform system of signs for safe guarding railroad grade crossings, the Pennsylvania railroad is to begin at once in the states of Pennsylvania and New York the installation of protective warning signs, which are designed to give advance notice of approach to crossings. The work of installation will be extended to other states, where preliminary warnings are not now in use, as soon as the necessary approval can be obtained from the state regulative authorities. The Board of Public Utility commissioners of New Jersey has taken up the application and approval for that commonwealth is now pending. Approval will also be requested in Delaware, Maryland, Virginia and elsewhere.



Type of Railroad Warning Sign Being Placed at Grade Crossings.

The new form of signal is devised especially to deal with the problem of inducing motorists to run at reasonable speed, and with their cars under full control, when nearing railroad crossings. This, it is expected, will be accomplished by the new "approach" signs, giving warning of crossings ahead in ample time to reduce to a safe speed.

A Standard Design.

The design which will be used is a standard adopted for such purpose by the American Railway association and consists of a metal disk 24 inches in diameter, having a black rim and divided into four quarters by a black cross on a white ground. The two upper quarters bear the letters "R. R." The sign will be mounted on a post of suitable height. The disc resembles that devised by the American Railway association as the standard "Stop" hand signal for watchmen at grade crossings where the volume of traffic requires such form of protection.

The new "approach" signs will be placed as nearly as practicable 300 feet from the crossings in both directions, and will be located on the vehicle, or right hand side of the highway. The exact point of location will be determined

in each case with a view to giving the greatest visibility and prominence.

Method of Maintenance.

In the State of Pennsylvania an agreement has been reached between the Pennsylvania railroad, the State Public Service commissions and the State Highway commission, by which the railroad will furnish the signs and posts and the commissions will arrange for their erection and maintenance. In New York state, the erection of the signals is covered by a new act of Legislature under which, as in the case of the State of Pennsylvania, the railroad will furnish the signs and posts and the municipal or county authorities will be responsible for placing and maintaining them. When occasion arises the maintenance of way supervisors of the railroad will be assigned to the duty of explaining to the local authorities the purpose and utility of the new signs.

Ultimately, it is intended by the American Railway association to extend the use of the "approach" signals, in uniform standard style, to all parts of the country and all railroads. The standard design was adopted for this purpose by a joint committee of the American Railway association and the National Association of Railway commissioners, and has been passed upon by a committee of the American Automobile association. This was done before the United States entered the war, but subsequent events interfered with the carrying out of the plan.

To Be Extended to All States.

With the approaching return of the railroads to private operation, it is now proposed to push the plan to execution in every state. When that is accomplished automobilists in all parts of the country will receive invariably the same warning of approach to a railroad crossing, with resulting great advantage from the viewpoint of safety and incentive to proper care. There will be no confusion over the use of different warnings in different states, as the standard "approach" sign will always mean the same thing.

A Safety First Message.

Cooperating with the New York Central railroad, Secretary of State Francis M. Hugo of New York has been promulgating a safety first message to 550,000 motorists in that state during the past few weeks, by inserting a card with each renewal of license, urging that all motorists exercise greater caution when approaching a grade crossing. This procedure was followed by Secretary Hugo several years ago and while there was no direct means of ascertaining how well motorists bore the warning in mind, Mr. Hugo is convinced that good resulted.

Still Great Need for Care.

That there is still great need for care on the part of motor car drivers in this respect is indicated from the fact that statistics show that each year more than 1500 persons are killed and 4000 injured on railroad crossings alone in the United

States and that the number is steadily increasing.

There is, however, a crumb of comfort in the comparison made in the annual report of the National Highway Protective society, which shows that during 1919 92 persons were killed on highway railroad grade crossings in New York state, and 48 in New Jersey, as compared with 117 persons killed in New York and 54 in New Jersey in 1918, a slight decrease.

CATALOGUE, BROWN PYROMETERS.

The Brown Instrument Co., Philadelphia, maker of pyrometers, thermometers, tachometers and other indicating and recording instruments, has just issued catalogue No. 12, entitled "Brown

SECRETARY HUGO'S WARNING TO MOTORISTS.

The majority of the deplorable accidents can be avoided by automobilists exercising care at grade crossings.

Don't take chances.

Even if a crossing is protected by gates, flag man or bell, be sure you are safe.

The best safety device in the world is a careful driver.

Stop, look both ways, and listen.

Play safe.

A moment's caution may save your life.

Pyrometers," consisting of 88 pages, eight by 10½ inches, with a handsomely embossed cover design and elaborately illustrated with 159 copper plate half tones and diagrams. Without question this booklet contains more information in an available form on the subject of pyrometry than has ever before been covered in any catalogue, and the matter is presented in a practical way and couched in plain language so as to be perfectly intelligible even to the general reader.

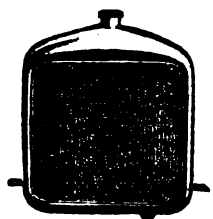
The catalogue No. 12 also gives valuable information regarding resistance thermometers, recording thermometers, pressure gauges, draft gauges, tachometers, time and operation recorders and other instruments included in the Brown line.

CATERING TO TOURISTS' COMFORT.

Roy H. Brown, distributor at Sacramento, Cal., for Columbia Six cars, made by the Columbia Motors Co., Detroit, when building his new sales and service station in that city, made provision for the installation of eight baths for the convenience of tourists. This is an innovation that will be greatly appreciated by many a weary, dust-covered motorist the coming season and is worthy of more general adoption in all sections of the country.



Practical Satisfaction



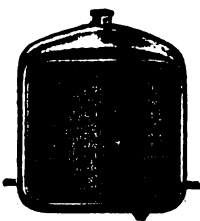
WHEN we say—"lower expense—greater efficiency—winter annoyances eliminated—more comfortable riding"—we only mention accomplishments that are possible with National Zig Zag Radiators.

NATIONAL ZIG ZAG RADIATOR

\$28.00 in black.

F. O. B. Detroit—Finished in either nickel or black enamel. Shipping weight complete 35 lbs.

\$30.00 in nickel.



DEALERS.

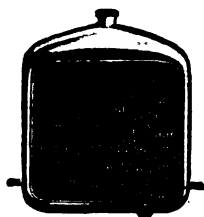
We are now in position to offer you an attractive agency proposition. Full information upon request.

NO guess work about these results. National Zig Zag principle—more water capacity—greater cooling surface—unusual expansion and contraction flexibility guarantees them.

Let us put you in touch with our nearest dealer.

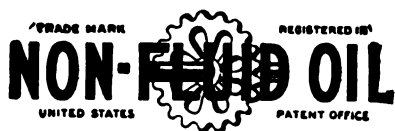
NATIONAL CAN COMPANY
Radiator Division

Detroit Michigan



"My Gears Run as Smooth as in Summer"

Said an all year round autoist and explained that this was because he used



which has the peculiar property of maintaining the same consistency in all temperatures.

NON-FLUID OIL also lasts longer than grease or gear oils and costs less per month for better lubrication.

Use "K-00 Special Grade" for Gears
"K-000" for all bearings

New York & New Jersey Lubricant Co.

401 BROADWAY, NEW YORK

EVANS - LAWRIE COMPANY

Wire Wheel Headquarters

THE Largest Stock of parts and the most complete wire wheel service station in New England.

Expert repairs of every kind and enamelling in all colors.

New England sales and service headquarters for Hayes, Houk and Rudge Wire Wheels.

Manufacturers distributors for Graton & Knight Fan Belts, Clutch Leather, etc.

McCord Mfg. Co.—Cylinder Head Gaskets.

National Acme Co.—S. A. E. Cap Screws and Nuts.

Atwater-Kent Mfg. Co.—Ignition Systems.

EVANS-LAWRIE COMPANY

(Automobile Specialists)

708-710 BEACON STREET,

BOSTON,

MASS.

LINSCOTT SUPPLY CO. REPRESENTS UNIVERSAL TOOL CO.

The Universal Tool Co., Inc., Detroit, Mich., manufacturer of Universal cylinder reborer tool and Ford and Fordson main bearing replacement equipment, is very ably represented in Boston by the Linscott Supply Co. This is one of the best known concerns in the automotive supply industry in New England, having for many years enjoyed an excellent patronage, based upon a firm foundation of integrity and good will.

Visitors to the Boston show will undoubtedly find the Linscott display attractive and notable.

NAPCO GRAPH-OIL, A NEW SPRING LUBRICANT.

The National Automotive Products Co., 331 The Arcade, Cleveland, O., has perfected the formula of a lubricant for the springs of automobiles, which may be effectively applied without spreading



the leaves of the springs. This has been named "Napco Spring Graph-Oil," and consists of seven different ingredients, the base of which is a high-grade lubricating oil, together with graphite, creosote and four other penetrating oils. It is said to contain no naphtha, kerosene or gasoline.

"Graph-Oil" is applied to one side of the spring, and it is stated by the manufacturer that it will penetrate between the leaves without spreading, and will come out on the opposite side in from 30 seconds to three minutes time, leaving a graphite deposit between each leaf. It is also claimed that if it is applied to a rusty nut or connection it will sink in around the threads, loosen the bond of rust or corrosion, making removal easy.

Napco Graph-Oil is guaranteed to remove rust, to prevent it from forming and not to collect dust. It is put on the market in 16-ounce cans at a list price of 75 cents a can. Dealers' discount supplied on application.

GUTHARD MAKES \$100,000 SHIPMENT.

The Edgar C. Guthard Co., Chicago, recently shipped a full car load of its Billmont Master wrenches to a group of Pacific coast jobbers. The Billmont is a socket wrench designed to be almost as universal in its utility as a monkey wrench. The shipment in question consisted of 10,000 of these wrenches, each having a retail value of \$10. The necessary sockets, five for each tool, went with each wrench, also a special adapter which permits the use of any standard size socket.

Furber 100 Per Cent. Spark Plug

After several years of experimenting, costly investigation and exhaustive tests, a spark plug has been developed and placed on the market by the Furber



Frederick M. Furber, President and General Manager, Furber Manufacturing Co.

Manufacturing Co., 614 Washington street, Lynn, Mass., that is claimed to be 100 per cent. efficient for use under all conditions to be met with in modern gasoline engines and will stand the terrific pounding of the highest compression motor.

The plug itself, as well as the method of its manufacture and the machinery used, are protected by patents secured both in the United States and abroad. The Furber company states that it is willing to stake the reputation of the Furber 100 Per Cent. Plug on the high quality of its insulation alone. The electrode wires are of special nickel-



Roland T. Parker, Vice President and Sales Manager, Furber Manufacturing Co.

manganese alloy, which will not burn or fuse. The center electrode is cemented and baked in by a new process which allows for expansion and contraction and at the same time makes it inseparable from the insulator.

Outside of the quality of material used the merit of any spark plug depends largely on the method of securing the insulator within the shell. Continued experiments and tests have shown that a permanently tight joint is impossible when the common methods of making a joint between the insulator and shell are used. The average plug leaks compression; most users of plugs know that if a two-piece plug is tightened enough to make it gas tight, the insulator is generally broken.

In the Furber 100 per cent. plug the insulator is placed in the shell with two gaskets and one hard brass ring, one gasket under the insulator, the hard brass ring and the other gasket on the top shoulder. It is then passed to an automatic machine, which turns the flange of the shell over the shoulder of the insulator, applying 4000 pounds pressure on one small portion of the flange, this being progressively done all the way around the flange until finally 210 blows of the die, each with 4000 pounds pressure, have been applied. Yet at no time has the insulator been subjected to more than 4000 pounds pressure at one time. This process actually rivets the insulators in.



Car Load of Billmont Wrenches Recently Shipped by Edgar C. Guthard Co.

The maker gives a positive guarantee that the Furber 100 per cent. spark plug must give satisfaction or money will be refunded.

The officers of the Furber Manufacturing Co. are: President and general manager, Frederick M. Furber; vice president and sales manager, Roland T. Parker; treasurer, Harry Eisner. Production plans contemplate the manufacture of about 1,000,000 plugs the present year.

ELLIS JOINS V. A. NIELSEN CO.

Robert M. Ellis, who is well known in the automobile trade of the East, has joined the firm of V. A. Nielsen Co., manufacturers' sales agent for automobile equipment, 708 Beacon street, Boston. Mr. Ellis has been for some years manager of the Splittorf Electrical Co. and will have charge of the sales department of the Nielsen Co., which represents, among other well known lines, Connecticut ignition, India ignition and starting cable, and Briggs-Stratton Co.'s Basco switches. In coming to the Nielsen Co. Mr. Ellis becomes secretary and Mr. Nielsen is treasurer.

SPINDLE CONNECTING ROD (OR TIE ROD) BENT FROM THE STRAIN OF SHOCKS AND JOLTS WHICH WEAKENS THE ENTIRE FRONT SYSTEM AND THROWS THE FRONT WHEELS OUT OF ALIGNMENT

BUCKLED FROM STRAIN OF SHOCKS AND JOLTS AND THE DANGER OF GOING OVER CENTER TRAVEL WHICH MEANS THE LOSS OF CONTROL IN

A Ford Controlling Itself

SPINDLE CONNECTING ROD (OR TIE ROD) RELIEVED OF THE STRAIN FROM SHOCKS AND JOLTS WITH THE OVER-LAND GUIDE

STEERING CONNECTING ROD BUCKLING STRAIN RELIEVED AND THE DANGER OF GOING OVER CENTER TRAVEL PREVENTED BY

The Over-land-Guide
PATENTED
Controlling the Ford

This Broad Guarantee Protects Users of the Over-land Guide

Send us retail **\$8.50**

price, and we will send you parcel post, one Over-land Guide. Use it 20 days, properly installed, and if at the end of that time you are willing to part with it full purchase price will be refunded upon its return.

The Over-Land Guide is proving to be the big selling Ford car and truck equipment of the year.

Every owner wants and needs one. It sells at sight and creates a demand wherever Ford cars or trucks are used. Sales are limited only by the number of these cars and trucks in service.

The Over-Land Guide is a highly developed and wonderfully efficient device that absolutely controls the steering of the Ford car or truck. It is sold with an iron-clad guarantee of service, economy and satisfaction.

The kind of equipment that every jobber and dealer can place and which adds greatly to his prestige and profits.

A Wonder Worker

The driver can steer the machine with the tips of his fingers.

The wheels will always keep in alignment over rocky, rutty or hilly roads, through sand, gravel, mud holes or washouts.

Even though the steering gear be broken or fails to work, the Over-Land Guide will continue to keep the Ford car or truck on a straight course.

It protects the entire front system and steering mechanism from undue wear and breakage. The Over-Land Guide absorbs all shocks and stresses.

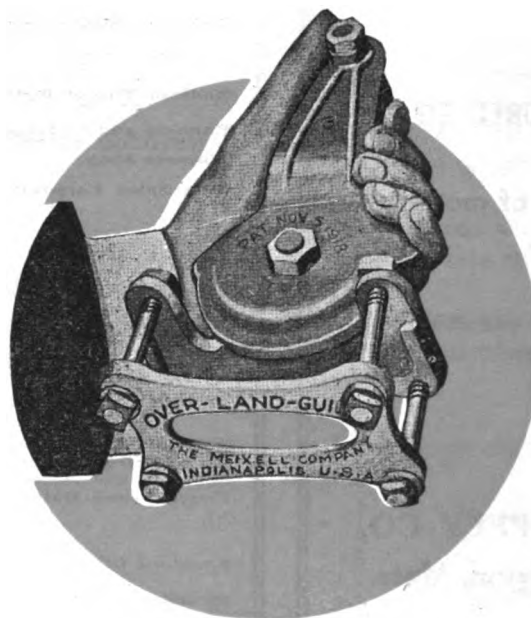
It Stops All Wabbling, Scooting and Creeping

It eliminates all danger from a blow out of a front tire at any speed, as the Over-Land Guide will hold the Ford car or truck to its course.

It eliminates all strain in driving. It will save in time, repair bills and car service.

It is car insurance of the highest order. It insures against ditching of the car, which oftentimes proves fatal to the occupants.

The Over-Land Guide cannot fail to work or get out of order. It is finely made, slightly and will last for years. Estimate the worth of an Over-Land Guide from any viewpoint—safety, service and dependability.



The OVER-LAND GUIDE bolts to the center of the front axle and the center of the spindle connecting rod (or tie rod), securely relieving the vibration and strain in the spindle connecting rod (or tie rod) and the entire front system, and the steering mechanism up to the steering wheel. Can be attached in a few minutes by anyone.

It will add generally to car efficiency, convenience, pleasure and comfort, and assures the longest possible service life to a Ford car or truck.

The Over-land Guide Protects These Parts

Spindle connecting rod (or tie rod). Spindle body arms and bushings. Spindle body and bushings. Ball and roller bearings and hub. Steering connecting rod and ball joints. Steering gear ball arms. Steering post bracket, bushing and bolts. Steering post. Steering gear pinion. Steering gear drive pinions. Steering gear internal gear case and bushings.

Also helps to keep axle from breaking or bending—and may save the entire car from destruction.

Jobbers and Dealers—We offer a 100% utility attachment. All Ford car and truck owners will buy at sight. Sales are limited only to the number of Fords in use. The market is everywhere. Our proposition is liberal and the discounts will satisfy you.

Write or wire for full particulars

THE MEIXELL COMPANY
216 Board of Trade Building
INDIANAPOLIS, IND.

(Automobile Sundries Co., 18 Broadway, New York, N. Y. Sole Foreign Agents)

(When Writing to Advertisers, Please Mention the Automobile Journal.)

TRADE MARK
EAGLEINE
REGISTERED
**MOTOR
OILS**



EAGLEINE OILS

are unequalled for motor lubrication, freer from carbon, economical because they protect the motor against mechanical wear, and the quantity required is comparatively small.

These are the claims of thousands of motorists,—some with years of experience, who want full value, and more who know the value of high grade lubricants, and who know when they obtain satisfaction.

EAGLEINE QUALITY IS INSURED TO YOU

A grade for every type of motor. It is sold in sealed containers.

*Let us send you our new book and chart.
It is free at request.*

EAGLE OIL AND SUPPLY CO.

44-45-46 India Street, Boston, Mass.

NEW YORK CITY
Woolworth Building

CHICAGO
1132 W. 37th Street

AUTOMOBILE JOURNAL INDEX TO ADVERTISERS

	Page
Bancroft Tire Co.....	6
Barrett Co., The.....	43
Boston Auto Tire Exchange.....	7
Boston Retread Tire Co.....	6
Brightman Auto Exchange.....	6
Brown Spring Oiler Co.....	49
Coe's Wrench Co.....	49
Connecticut Auto Parts Co., Inc.....	6
Cormack Co.....	7
Culver-Stearns Manufacturing Co.....	44
Detroit Radiator & Specialty Co.....	6
Dixon Crucible Co., Joseph.....	46
Eagle Oil and Supply Co.....	2
Flinherty, Wm. H. Co.....	7
Grant Motor Car Co.....	46
Gulf Refining Co.....	5
Ideal Tire & Rubber Co.....	4
India Tire & Rubber Co.....	Cover
Jackson Motor Service Co.....	7
Madison Tire & Rubber Co.....	Cover
Magneto and Generator Exchange of N. E.....	7
Magneto Shop.....	7
Mets Sales Corporation.....	44
National Can Co.....	47
New Departure Manufacturing Co.....	47
New York and New Jersey Lubricant Co.....	47
Nielsen Co., V. A.....	47
Northwestern Chemical Co.....	8
Paige-Detroit Motor Car Co.....	48
Pierce-Arrow Motor Car Co.....	Cover
Standard Oil Co. of N. Y.....	45
Strandway Auto Parts Co.....	6
Syracuse Rubber Co., Inc.....	Cover
Zenith Carburetor Co.....	44

(When Writing to Advertisers, Please Mention the Automobile Journal.)

AUTOMOBILE JOURNAL

INDEX TO CONTENTS

Published Monthly by the
AUTOMOBILE JOURNAL PUB. CO.
Times Building, Pawtucket, R. I.

WILLIAM H. BLACK.....Treasurer
DAVID O. BLACK.....Secretary

Branch Offices: New York City, Chicago, Detroit,
Boston, St. Louis, Cleveland.

SUBSCRIPTIONS:

United States and Mexico (Postage Paid) the year \$1.50
Canada\$2.50
Foreign Countries in Postal Union.....\$3.50
The Copy.....20 Cents

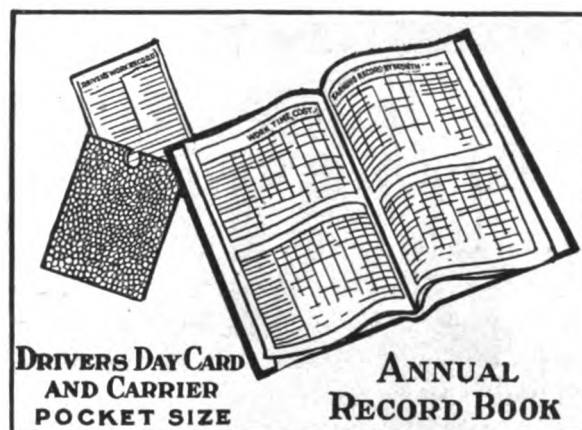
PARTIAL LIST OF CONTENTS

	Page
*Boston Show Record Making for Car Sales..	9
*Points on Operation and Adjustment for New Car Owners.....	14
*Tire Industry and Trade.....	17
*Activities of Portage Rubber Co.....	17
Goodrich Co Makes Highway Maps.....	17
*Firestone Co. Vice Presidents.....	18
*Lambert Tires Help Mail Delivery.....	19
*New Manager for Baltimore McGraw Branch	19
Pennsylvania Co.'s Annual Meeting.....	20
*Industrial Assembly Established at Goodyear Plant	21
Uses for Old Rubber Inner Tubes.....	22
*Humorous Side of Motoring.....	23
Summary of Defects and Remedies.....	28
*Proper Alignment of Automobile Wheels....	31
*Avoid Excessive Use of Clutch.....	32
Hints on Soldering for Motorist and Repair Man	33
*New Plants of Timken-Detroit Axle Co.....	34
*New Accessories.....	36
*New Goodyear Girls' Dormitory.....	42
Calendar of Coming Events.....	42
*Mechanical Queries.....	44

*Indicates Article Is Illustrated.

Know what it costs to Run your Truck
Learn what your Truck Earns
Know your Truck Profit and Loss

UNIVERSAL MOTOR TRUCK ACCOUNTING SYSTEM



The system includes an annual record book, 350 drivers' day cards, a day card carrier and full instructions.

Any owner can start this system at any time with an old or new truck of any make or type.

Any boy or girl clerk can maintain all records for one or a hundred trucks.

Each system is good for one year, nothing more is needed or necessary.

The records show at a glance any and all items entering into the earnings and cost of operation.

It is extremely simple. 100% complete and full working instructions are supplied with each system.

It is almost self-operating.

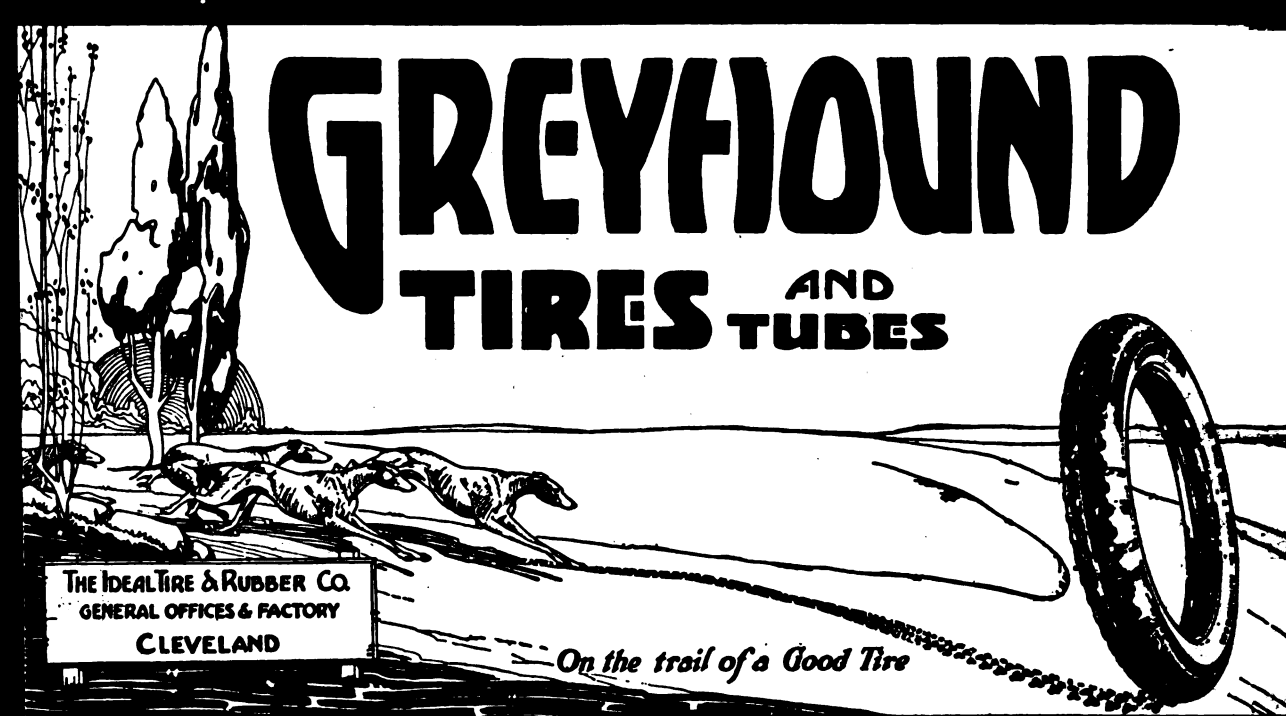
Price \$10 — Delivered

Address Record Department

MOTOR TRUCK

Pawtucket,

Rhode Island.



The illustration depicts a greyhound dog running across a road, leaving a long, dark, textured trail behind it. On the right side of the road, a large, detailed tire is shown. In the background, there are stylized trees and a sign on the left that reads: "THE IDEAL TIRE & RUBBER CO. GENERAL OFFICES & FACTORY CLEVELAND". The title "GREYHOUND TIRES AND TUBES" is prominently displayed in large, bold, sans-serif capital letters across the upper middle of the scene.

GREYHOUND TIRES AND TUBES

THE IDEAL TIRE & RUBBER CO.
GENERAL OFFICES & FACTORY
CLEVELAND

On the trail of a Good Tire

(When Writing to Advertisers, Please Mention the Automobile Journal.)

At the sign of the orange disc

THERE are no "carbon-less" motor oils. Petroleum is a Hydro-carbon product and it is impossible to extract the carbon. Neither is it possible to prevent a portion of the oil from working up into the combustion chamber. Hence, there is sure to be more or less carbon deposited.

Supreme Auto Oil *Leaves Less Carbon*

in the combustion chamber, as it contains no paraffine—most of the free carbon is blown out with the exhaust.

Paraffine forms a gummy substance which collects and holds the carbon, allowing the extreme heat to harden it upon the piston head. A great deal of trouble may be eliminated, therefore, by the use of SUPREME AUTO OIL.



**Look for the
Sign of the Orange Disc**

GULF REFINING COMPANY

General Sales Offices: Pittsburgh, Pa.

DISTRICT SALES OFFICES:

New York
Atlanta

Philadelphia
New Orleans

Boston
Houston

(When Writing to Advertisers, Please Mention the Automobile Journal.)

TRADE OUTLET

QUICK SERVICE THE WESTERN UNION TELEGRAPH COMPANY LOW RATES Form 3300
MONEY TRANSFER SERVICE

The Bancroft Tires *Portland Me. 2/26*

The following is a message or order contained in a money transfer dated *Feb. 25th 1920* for \$ *50⁰⁰ ⁰⁰/₁₀₀*

from *Duttee Pearce* *Seattle, Wash.* paid you herewith:

Deposit for set of tires instructions following

F. M. Lewis
TRANSFER AGENT

A LONG, LONG, WAY FROM HOME!

Three Thousand, Four Hundred and Six Miles!

That's a long way to go for a tire—but it's what this man did. We had sold him one previously—this order shows what he thought of it.

If it was worth his while to send over three thousand miles to get a Bancroft Tire, it will surely pay you to investigate our proposition. We promise you we will save you money—at least 40%.

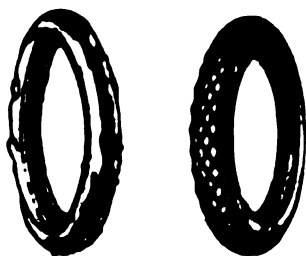
THE BANCROFT TIRE CO.

RECORD BUILDING

Dept. 77

PORTLAND, MAINE

BOSTON RETREAD TIRE CO.



Before

After

OUR METHOD OF RETREADING IS DIFFERENT FROM OTHERS.

We use all Goodyear first quality stock and retread bands and can absolutely guarantee from

3000 to 3500 Miles.

We will replace a new tire for every one that our work does not give satisfaction.

Tires called for and delivered. We pay express charges one way on all out-of-town orders.

Price List Mailed Upon Request.

BOSTON RETREAD TIRE CO.
70 Clarendon St., Boston, Mass.

AUTO PARTS.

50% to 90% OFF List.

24 Hour Service. Unlimited Stock.
Pope-Hartford, Columbia, Reo,
Overland and 200 other makes.

Motors, \$20.00 up | E. Presto Tanks, \$4.00
Magneto's, \$3.50 up | B. Presto Tanks, \$4.75
Cylinders, \$3.00 up | Bearings, 50c up
Springs, \$1.00 up | Rims, \$1.00 up

1000 Other PARTS Bargains.

If you want any part not listed here,
Write Us—We Have It.

Conn. Auto Parts Co., Inc.

18-20 Morgan St., Hartford, Conn.

AUTO SAVE 50-90% FOR 400 CARS PARTS

POPE, PACKARDS, PIERCE, BUICK,
STEVENS-DURYEA, KNOX, OVER-
LAND, ETC.

Motors, \$25.00 up | Presto Tanks, \$4.50 up
Magneto's, 4.00 up | New Spotlights, 2.00 up
Carburetors, 3.00 up | Generators, 10.00 up
Rear Axles, 15.00 up | Gears, 1.00 up
Front Axles, 5.00 up | Bearings, 1.00 up
Cylinders, 5.00 up | Radiators, 10.00 up

\$12 Diamond Bumpers.....\$5.50

Jobbers in Bankrupt Auto Supplies.

BRIGHTMAN AUTO EXCHANGE

321 Windsor Ave., Hartford, Conn.

AUTO PARTS—At Your Own Price.
We can supply parts for nearly every make of car. 648 Packards, Interstate Fours, also Truck parts, GMC and other makes.

Write us for Parts. We have them.

STRANDWAY AUTO PARTS CO.,
192-196 H. St., South Boston, Mass.

SPEED OR POWER FOR THE FORD.

Install a set of:

- 2 1/2 —1 Gears in the Racy Type
- 3 —1 Gears in the Roadster
- 4 —1 Gears in the Delivery

Our Trade Mark—A star on every gear insures quality.

DETROIT RADIATOR & SPECIALTY CO., 968 Woodward Ave., Detroit, Mich.

—CLASSIFIED ADVERTISING PAYS—

Advertise the bargains that you have to offer.

8000 Buyers Read MOTOR TRUCK.

(When Writing to Advertisers, Please Mention the Automobile Journal.)

TRADE OUTLET

At 304
**Columbus Ave.
For K-E-E-P-S**
304

Selling Slightly Used Tires. The Largest Stock in the East. "Your Money's Worth or We Make Good." Remember Our Prices Will Interest You.

Size	Tires	Size	Tires
30x3	\$4.50 down to \$2.40	33x4 1/2	\$12.00 down to \$6.00
30x3 1/2	6.50 down to 3.40	33x5	14.50 down to 8.00
32x3 1/2	8.75 down to 3.90	35x4	10.50 down to 9.00
31x4	8.00 down to 4.00	34x4 1/2	10.00 down to 6.00
32x4	8.25 down to 5.00	35x4 1/2	12.00 down to 6.50
33x4	9.00 down to 5.50	36x4 1/2	12.00 down to 6.00
34x4	10.75 down to 6.00	35x5	25.00 down to 6.90
32x4 1/2	12.00 down to 7.00	36x5	12.00 down to 8.00
		37x5	14.00 down to 6.00

USED TUBES, ALL SIZES, AT \$1.50 TO \$2

MAIL ORDERS given prompt attention. Tires sent C. O. D. with privilege of examination. 5% discount if cash or money order comes with order.

BOSTON AUTO TIRE EXCHANGE
304 COLUMBUS AVE. TEL. B. B. 7329

Magneto and Generator Exchange of N. E.

44 COLUMBUS AVENUE, BOSTON, MASS.

SAVE 50%

Offers

Quality Service for your car.

Starting, Lighting, Ignition.

One year guarantee on repairs and installations of all makes.

Everything pertaining to Auto, Electricity, Magneto and Generator Parts. We have one of the best equipped shops in New England devoted exclusively to this work.

BOSCH, SPLITDORF, EISEMANN, DIXIE, BERLING MAGNETOS
and Parts Always in Stock.



Magneto Repairs

Skillfully Done. Assured Satisfaction. Prompt Service.

The repair work turned out of this shop is of the highest merit—because I know how. If you have electrical and magneto troubles, no matter whether it is a

BOSCH, SPLITDORF-EISEMANN, or any other make, I can fix them. My well-appointed plant, coupled with skilled workmen, assures you of expert magneto service. Send in your magneto. 24-hour shipment.

Rebuilt Magnetos, Platinum Parts, Generator Brushes, Bearings, Etc.

Correspondence Invited.

The Magnete Shop

JOHN BRUNSWICK,

187 Massachusetts Ave., Boston, Mass.

Every Ford owner should read "Transforming the Ford." Tells how to secure smooth, positive brake action that no car can excel. A little "transforming" and your car will glide to a quick, quiet stop without the annoying, irritating clatter that you now experience. It will go into low or reverse without jumping or jerking, and you can pick up speed with all the smoothness and ease of a high-priced car. All accomplished without additional expense and the result is a clear saving of 75 per cent. in one direction alone. "Transforming the Ford" tells how it's done. Send for your copy this very minute. 10c stamps or coin. CORBACK CO., Dept. 57, 500 Fifth Ave., New York City.



BOSTON'S Finest Equipped Auto Electric Repair Service

With a staff of trained electrical men we can offer auto owners expert service, coupled with promptness and personal attention to all electrical repair problems. We also repair any electrical equipment used on a motor car. Official service and parts representative for

AUTO-LITE LIGHTING AND STARTING SYSTEMS.

Complete Stock of
GENUINE PARTS.

All Work and Parts Guaranteed.

William H. Flaherty Co.

74 CUMMINGTON ST., BOSTON, MASS.

Tires Guaranteed 5000 Miles

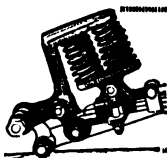
30x3 plain	\$8.00
Non-Skid	\$10.00
30x3 1/2 plain	\$11.00
Non-Skid	\$13.50

Big saving on other sizes and tubes also. Trade in your old tires. 20% deposit required on C. O. D. orders.

Write for lists to

M. Liben & Co.

793 J 7th Ave., New York City.



"CHAMPION" Shock Absorbers for Ford cars. Write for our price. Special offer. **Champion Shock Absorber Sales Co.**, 918 N. Senate Ave., Indianapolis, Ind.

SALESMEN to sell first class Air Pump to garages in New York and adjoining cities. Address **Piston, Accessory & Garage Journal.**

JACKSON PARTS ALL YEARS and MODELS

Prompt and Satisfactory Service
Guaranteed.

Jackson Motor Service Co.
Brighton District, Boston, Mass.

(When Writing to Advertisers, Please Mention the Automobile Journal.)

Filmed at Gathering of Leading Jobbers in Marietta, Ohio. Nov. 8-12, 1919

Jobbers Present:

S. K. Wallace, Tampa, Fla.
 A. J. Hopkins, Montreal, Quebec.
 E. V. Plane, Columbia, S. C.
 G. B. Shearer, Philadelphia, Pa.
 J. N. White, Dallas, Tex.
 A. A. Ways, Dallas, Tex.
 A. J. Johnson, Cincinnati, O.
 J. G. Fitzsimmons, Charlotte, N. C.
 W. H. Van Horn, Oil City, Pa.
 F. Hamilton Suter, Milwaukee, Wis.
 Dunbar Abston, Memphis, Tenn.
 W. Justice, St. Joseph, Mo.
 Troy B. Wildermuth, Harrisburg, Pa.
 H. B. Smith, Cleveland, O.
 H. T. Schleining, New York, N. Y.
 M. Shapiro, Philadelphia, Pa.
 W. L. Ferrier, St. Louis, Mo.

Just as Robinson of Montreal Told the Jobbers

After SE-MENT-OL had been subjected to a series of conclusive tests before a representative gathering of automotive equipment jobbers in Marietta, Prescott W. Robinson of Montreal, Quebec, sounded the keynote of the meeting when he said:

"Now, gentlemen, I am sure that, after watching all these tests, you feel as I do—that SE-MENT-OL has proved itself to be, beyond argument, the radiator repairer that **does the work**, quickly and thoroughly. I feel that it is the kind of goods we all want to push—goods that we can stand back of to the limit."

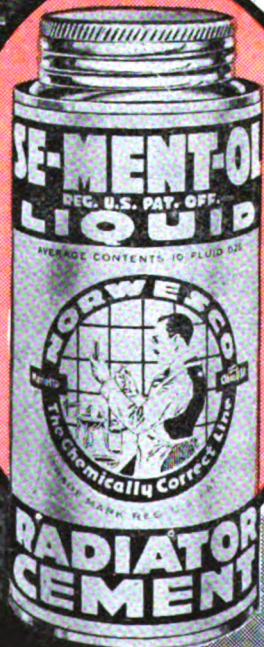
Before this critical audience of jobbers SE-MENT-OL was tested, not only for rapidity in action, but for permanence of repair, and absence of any clogging or injurious effects. The demonstration was then climaxed by the complete renovation of a dilapidated car with NORWESCO products, making it new-looking again.

If the jobber you deal with was "among those present" he will tell you not only to stock SE-MENT-OL but to concentrate on it.

The demonstration before the jobbers was filmed, and the film will be shown throughout the country through the courtesy of jobbers.

**SE-MENT-OL
DISPLAY STAND
FREE**

This steel display stand, lithographed in attractive colors, free with two dozen cans of Se-Ment-Ol. A big sales booster.



The Northwestern Chemical Co.

723 State St., Marietta, Ohio, U. S. A.

Canadian Factory: Montreal



SE-MENT-OL
 (THE ORIGINAL)
"Finds the Leak and Fixes It"

(When Writing to Advertisers, Please Mention the Automobile Journal.)

THE AUTOMOBILE JOURNAL

VOL. LXVII.

PAWTUCKET, R. I. MARCH, 1920.

NO. 8.

Boston Show Record-Making For Car Sales

*Exhibition Is Largest of the Year in
Number of Exhibits, Attendance, and
Productiveness—Bodies and Equip-
ment Show High Development—Many
New Cars, Trucks and Tractors.*

TRUE to the traditions of former years, the 18th annual automobile show of the Boston passenger car, commercial motor vehicle and accessory dealer again broke its previous records in point of magnitude, diversity and comprehensiveness of exhibits, attendance and amount of business transacted.

In spite of setbacks at the outset in the way of lack of transportation facilities which threatened to delay the arrival of some of the promised exhibits from the big western factories beyond the opening time, if not to seriously curtail some displays. Manager Campbell and his efficient corps of assistants and the hundreds of exhibitors had co-operated to have everything ship shape and in its usual festival attire when the doors of Mechanics' building and the Irvington Street armory were thrown open to the public at 2 o'clock Saturday, March 13, in the midst of a storm that was almost a blizzard. The New England motor enthusiasts who had been anticipating the event, were, however, not to be daunted by any ordinary adverse weather conditions and, during the opening hours the affair attained almost the proportions of

an ovation to the show management and the officials of the Boston Automobile Dealers' association and the Boston Commercial Motor Vehicle association, under whose auspices it was held, as well as to those in charge of the various exhibits.

such stupendous magnitude.

Decorations Were Elaborate.

The beautiful Annapolis valley, the land of the Arcadians, furnished the inspiration for the artistic background for the principal decorative feature for the show. The primeval valley, made his-

toric by its romantic associations with Evangeline, Longfellow's beautiful heroine, was pictured with the delicate bloom of spring time showing on thousands of apple trees and made a strikingly attractive setting for the bright new models of motor cars.

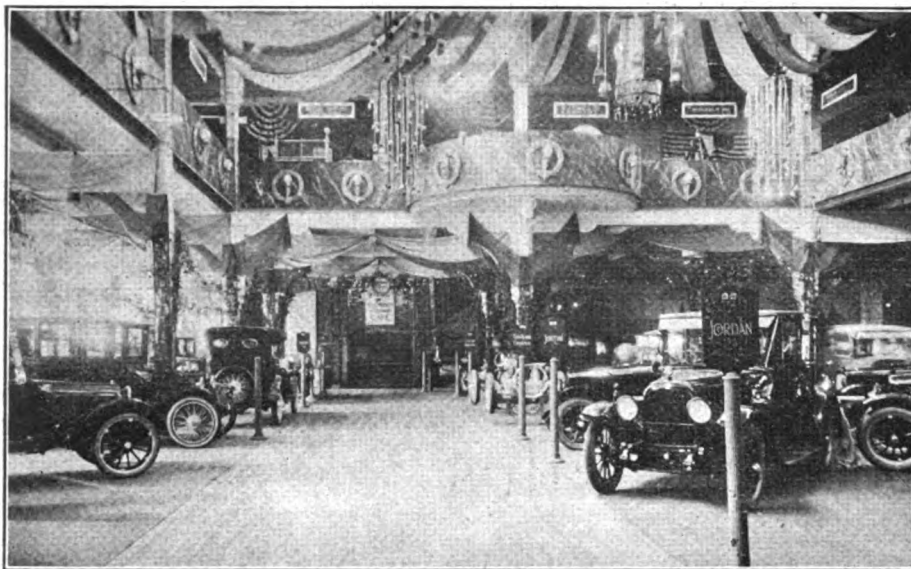
The treatment of the entrance of Exhibition hall was oriental in its gorgeousness. Richness and warmth of coloring prevailed. The section of the show in the Armory, where the Yankee Division club was the immediate sponsor and beneficiary, was a blaze of electric light and thousands of lights on floral festoons.

With a wealth of costly material, native and foreign, blended into a harmonious design, the decorative features of both buildings proved the equal of any of its predecessors which have become famous as being the most beautifully decorated auto shows in the country.



Overlooking the Floor of Grand Hall, the Main Division of the Passenger Car Department, Looking Toward the Stage from the Balcony.

The festive appearance of the various exhibition halls, as well as the general attractive arrangement of booths and exhibition spaces bore mute but convincing evidence of the amount of hard work involved in the preparation of an adequate setting for an exposition of



A Glance Along the East Aisle of the Floor of Exhibition Hall, Among the Passenger Cars, Looking Toward Grand Hall.

More than 10,000 vari-colored electric lights, intensified by spans of huge leaded glass arches, produced a riot of color startling in its beauty. It is stated that from \$50,000 to \$75,000 was expended on these decorative features alone, which were again this year under the personal supervision of A. W. Campbell.

Attendance Was Large.

After the opening flurry of Saturday the weather for the following week proved all that could be desired, until the last day, Saturday, the 20th, when the elements again ran riot in a driving rain storm which contrasted strongly with the atmosphere of cheerfulness within the exhibition halls imparted by the myriad lights and brilliantly colored decorations to the bustling crowds intent on making the most of the closing hours of the big show.

It is stated that the morning and afternoon attendances were far in excess of all previous records as, in the phenomenally crowded conditions which prevailed night after night, it was well nigh impossible for anyone bent on actual business to secure an adequate idea of the fine points of the various exhibits. For this reason the day time visitors were largely intent on a more minute inspection of the various details in construction and equipment, and the bulk of the sales were stated to have been consummated at this time. True there was at times not the crush that marked some of the special days in the past, for Manager Campbell eliminated Society day, Governor's day, etc., this year and perhaps for that reason the attendance was more even throughout all the sessions.

Demonstrations that have heretofore characterized these motor shows were not as numerous as previously. This might have been the result of poor traffic conditions this year, but the prevailing opinion was to the effect that New England motorists are sufficiently motor wise as to be able to select their cars without having to be influenced by a road test.

The various exhibits were not only attractive in their settings, but also un-

usually complete in detail and effective in arrangement, and in regard to magnitude all previous shows have been small in comparison. There were, in all, 355 exhibits, including 88 different makes of passenger cars, comprising some 400 models, 170 models of trucks shown by 69 makers and 207 different exhibits of accessories, comprehending everything worth while in motor car equipment that might add to economy and ease of operation as well as to the comfort and pleasure of the motorist.

Five of the trucks shown were electric, and there were as well included in the truck section, three trailer exhibits, nine makes of tractors, seven of which were of the smaller type and three exhibitors making display of bodies exclusively.

It is also an illuminating fact in this connection that 117 would-be exhibitors, including five firms handling cars or trucks, were shut out because they applied for allotments too late and it was impossible to make room for them in 165,000 square feet of floor space afford-

ed in the combined exhibitions this year. This perhaps would partly account for a considerable number of exhibits and demonstrations in locations outside the shows proper.

It is further stated that not since the infancy of the motor car industry has there appeared in any one year so many new cars and accessories as have blossomed forth in this season of 1920, and most of these were shown to the New England public for the first time at the Boston show.

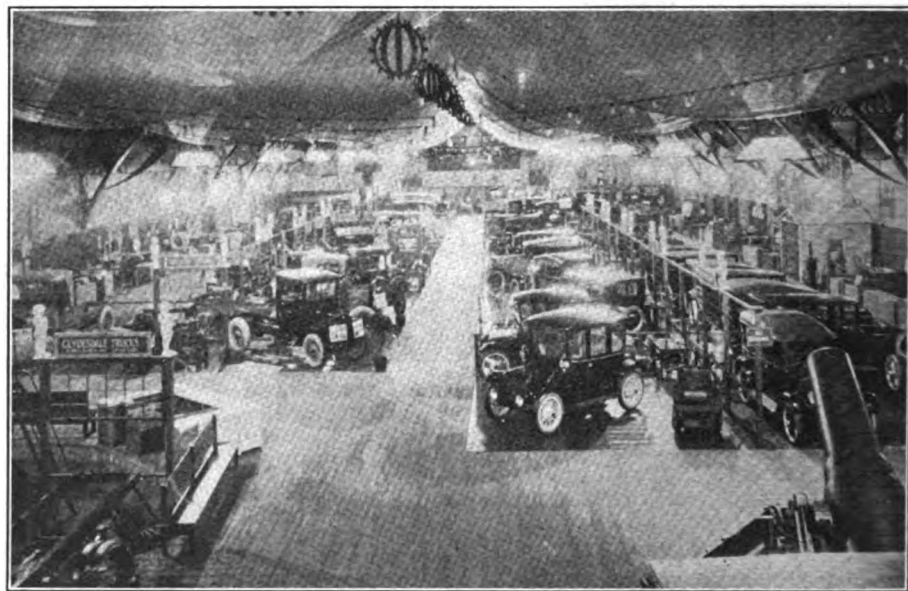
Two Millions Actual Business.

It is conservatively estimated that more than \$2,000,000 of actual business was transacted at the motor show this year, making it by far the most successful viewed from this standpoint that has ever been held in this city of successful shows. There was not a single dealer in either passenger or commercial vehicles or, for that matter, accessories, who was not pleased with the results of this eight days' display.

But while they are gratified with the sales, they are viewing the matter of delivery with a good deal of fear and trepidity. Actual sales did not give them as much concern as do deliveries, for with the unprecedented demand of the past few months and unsettled labor and supplies conditions, together with present unsettled transportation facilities occasioned by the congested state of the railroad and the scarcity of freight cars, the present visible supply of motor cars is pretty well exhausted, and the prospect for immediate relief is not particularly bright. In fact it was stated that there were three customers for every car available at the time of the show. This only emphasizes what has been well recognized for some time that a shortage of motor cars is bound to be experienced in this country this season.

Two Division Show a Success.

Operating the show in two divisions, in Mechanics' building and the South Armory, was in a sense experimental, for there was no certainty that the attendance at the annex would be such as would satisfy the exhibitors. Twice be-



A Glimpse of the South Armory Drill Shed from the Balcony, Showing the Miscellaneous Exhibits of Cars, Trucks, Tractors and Accessories.

Car Exhibitors at the Boston Show

Maker	Exhibitor.	Address
Allen.....	John L. Judd.....	685 Beacon St.
American.....	N. E. American Motor Car Corp....	94 Massachusetts Ave.
Anderson.....	The W. L. Russell Co.....	218 Elliot St.
Apperson.....	Apperson Motor Car Co. of N. E....	965 Commonwealth Ave.
Argonne.....	Hall Motor Co.....	971 Commonwealth Ave.
Auburn.....	F. A. Dutton Motor Co.....	*Ball Square.
Autowa.....	Will-Hall-Sutherland Motors, Inc....	388 Newbury St.
Biddle.....	Guertin-de Rochemont Co.....	749 Boylston St.
Brewster.....	George W. Canterbury, Inc.....	967 Commonwealth Ave.
Briscoe.....	Massachusetts Motors, Inc.....	108 Massachusetts Ave.
Buick.....	Boston Buick Co.....	97 Massachusetts Ave.
Cadillac.....	Cadillac Auto. Co. of Boston.....	664 Commonwealth Ave.
Case.....	Massachusetts Motors, Inc.....	108 Massachusetts Ave.
Chalmers.....	C. E. Fay-Allen Co.....	620 Commonwealth Ave.
Chandler.....	Chandler Motors of N. E., Inc.....	714 Beacon St.
Chevrolet.....	Chevrolet Motor Co. of N. E.....	27 Huntington Ave.
Cleveland.....	Chandler Motors of N. E., Inc.....	714 Beacon St.
Cole.....	Bryant G. Smith & Sons Co.....	661 Beacon St.
Columbia.....	R. R. Ross, Inc.....	839 Boylston St.
Commonwealth.....	Massachusetts Motors, Inc.....	108 Massachusetts Ave.
Crow-Elkhart.....	Schuh Motors Co.....	4 St. Botolph St.
Cunningham.....	Jas. Cunningham Son & Co.....	1117 Commonwealth Ave.
Daniels.....	J. W. Bowman Co.....	91 Massachusetts Ave.
Davis.....	Massachusetts Motors, Inc.....	108 Massachusetts Ave.
Detroit Electric.....	E. Y. Stimpson.....	530 Commonwealth Ave.
Dodge.....	Henshaw Motor Co.....	989-997 Com'wealth Ave.
Dort.....	Utterback-Gleason Co.....	793 Boylston St.
Elcar.....	King Motors, Inc.....	650 Beacon St.
Essex.....	Henley-Kimball Co.....	652 Beacon St.
Ferris.....	Reed Motor Car Co.....	961 Commonwealth Ave.
Ford.....	Ford Motor Co.....	*400 Brookline St.
Franklin.....	Franklin Motor Car Co.....	616 Commonwealth Ave.
Grant.....	Grant Motor Sales Co.....	702 Beacon St.
Haynes.....	W. L. Russell Co.....	218 Eliot St.
H. C. S.....	A. T. Hart Co.....	985 Commonwealth Ave.
Holmes.....	Holmes Motors, Inc.....	963-965 Com'wealth Ave.
Hudson.....	Henley-Kimball Co.....	652 Beacon St.
Huffman.....	Hosmer-Haid Co., Inc.....	757 Boylston St.
Hupmobile.....	Hall Motor Co.....	971 Commonwealth Ave.
Jackson.....	Harris Motors Co., Inc.....	18-22 Brighton Ave.
Jordan.....	Hinchcliffe Motor Co.....	87-91 Massachusetts Ave.
King.....	King Motors, Inc.....	650 Beacon St.
Kissel.....	Spencer-Reed Co., Inc.....	1265 Boylston St.
Lexington.....	Lexington Automobile Co.....	753 Boylston St.
Liberty.....	G. M. Leghorn Co.....	860 Commonwealth Ave.
Locomobile.....	Locomobile Co. of America.....	700 Commonwealth Ave.
Maibohm.....	Mann Motor Car Co.....	801 Boylston St.
Marmon.....	Frank E. Wing.....	1249 Boylston St.
Maxwell.....	C. E. Fay-Allen Co.....	620 Commonwealth Ave.
McFarlan.....	Frank P. Anthony.....	80 Brookline Ave.
Mercer.....	Gilmore Motors, Inc.....	971 Commonwealth Ave.
Metz.....	Metz Sales Corp.....	801 Boylston St.
Milburn Electric.....	E. Y. Stimpson.....	530 Commonwealth Ave.
Mitchell.....	Mitchell-Lucas Motor Co.....	591 Boylston St.
Monroe.....	Middlesex Motor Car Co.....	709 Beacon St.
Moon.....	Triangle Motors Co.....	1094 Boylston St.
Nash.....	C. P. Rockwell, Inc.....	640 Commonwealth Ave.
National.....	A. T. Hart Co.....	985 Commonwealth Ave.
Noma.....	New England Motors, Inc.....	164 Brighton Ave.
Oakland.....	Dunbar, Sanders, Inc.....	655 Beacon St.
Oldsmobile.....	Boston Oldsmobile Co.....	940 Commonwealth Ave.
Olympian.....	Woodbridge Co., Inc.....	92 Massachusetts Ave.
Overland.....	Connell & McKone Co.....	533 Commonwealth Ave.
Owen-Magnetic.....	U. S. Motor Truck Co. of N. E.....	305 Tremont Bldg.
Packard.....	Packard Motor Car Co. of Boston....	1089 Commonwealth Ave.
Paige.....	Paige-Detroit Co. of N. E.....	532 Commonwealth Ave.
Paterson.....	Porter Square Motor Co.....	*824-826 Somerville Ave.
Peerless.....	Beacon Motor Car Co.....	660 Beacon St.
Pierce-Arrow.....	J. W. McGuire Co.....	745 Boylston St.
Premier.....	Wells Motor Co.....	928 Commonwealth Ave.
Rauch Lang Elect.....	N. Rommelfanger.....	398 Newbury St.
Renault.....	Alfred Cutler Morse.....	705 Beacon St.

fore Horticultural hall has been a division of the show and comparatively few visited it, the visitors finding so much to interest them that they devoted all their time to the main departments.

This year General Manager Campbell organized the show in the South Armory with the Y-D Club as a beneficiary. The armory is but two short blocks distant and the exhibits were general, consisting of cars, trucks, tractors, bodies and accessories. The arrangement of the exhibition space was with an aisle encircling the floor, so that visitors in their movement must necessarily pass each exhibit.

The armory show was large and interesting. In it were many of the late applicants for space, and because many of the exhibits were new there was a very general desire to see them. The attendance was extremely good, and while there was a disposition by exhibitors at first to judge business possibilities by the attendance, and assume that these were few as compared with those of the exhibitors at Mechanics' building, when they learned that the visitors were buyers as a rule, and the volume of sales made were found surprisingly large, there was so great a measure of satisfaction that there is every reason to believe that the plan will continue if the armory can be obtained.

Must Provide for Increase.

The Boston show has so increased in proportions that it cannot be housed in any one building, and if it is to be unrestricted in natural development even the two structures used this year will not meet the demands unless the exhibitors are limited for exhibition area. That the truck division will equal, if not exceed, the car division another year is reasonably certain and provision must be made for this, for there is today quite as much interest in trucks as in cars, and the needs of power vehicle transportation were never so essential for industry.

The greatest evidence of this demand from the truck manufacturers and sales agents is that 48 exhibitors were allotted space in the main building and 21 in the armory, while a considerable number who wanted to make display was denied. All but five makes of cars were shown in Mechanics' building.

Many New Cars Shown.

The exhibits of new cars included Argonne, Cleveland, Commonwealth, Ferris, HCS, Huffman, Maibohm, Noma, ReVere, R & V-Knight, Stephens and Stevens-Duryea. The Autowa is a Ford chassis with various changes of equipment and a specially designed body that attracted no end of attention. Besides these the Brewster and Renault, both well known cars that have not been available for dealers, but which are now produced in sufficient numbers to justify exhibition, were shown. The Brewster is one of the highest grade American machines, and the Renault is one of the standard products of the French automobile industry. **Body Construction and Finish a Feature.**

What probably was impressed upon the observer above all else was the extreme care given to the development of body designs and body finish and equipment.

Name	Company	Address
Reo.....	Linscott Motor Co.....	566 Commonwealth Ave.
ReVer.....	Osborn-MacMillan, Inc.....	25 Jersey St.
Roamer.....	Alfred Cutler Morse.....	705 Beacon St.
R. & V. Knight.....	R. & V. Motors of N. E.....	704 Beacon St.
Saxon.....	Falk-Baker Co.....	893 Boylston St.
Scripps-Booth.....	Scripps-Booth Motor Car Co.....	5 Brighton Ave.
Standard.....	Standard Steel Motor Car Co.....	1110 Boylston St.
Stanley.....	Stanley Motor Carriage Co.....	Hunt St.
Stearns-Knight.....	J. H. MacAlman.....	96 Massachusetts Ave.
Stephens.....	Walter B. Hennigan, Inc.....	1035 Commonwealth Ave.
Stevens Duryea.....	George W. Canterbury, Inc.....	967 Commonwealth Ave.
Studebaker.....	Donovan Motor Car Co.....	626 Commonwealth Ave.
Stutz.....	Becker-Stutz Automobile Co.....	677 Beacon St.
Templer.....	Frederick J. Caldwell, Inc.....	1043 Commonwealth Ave.
Velie.....	New England Velie Co.....	80 Brookline Ave.
Victory.....	Victory Motor Co.....	58-60 Brookline Ave.
Westcott.....	Jackman-Jameson Motor Co.....	910 Commonwealth Ave.
Willys-Knight.....	Connell & McKone Co.....	533 Commonwealth Ave.
Winton.....	Winton Co.....	674 Commonwealth Ave.

*Cambridge.

†West Somerville.

‡Newton.

With rare exceptions every car was equipped with what would contribute to the comfort of the passengers, and seemingly the belief of manufacturers is that the stock car can be made so attractive to buyers that they will accept them as equal to special products.

So far as mechanical progression is concerned the cars are better built and better finished, the assembling details being perfected to insure stronger construction, greater accessibility, and enclosure of all working parts so far as this is practically possible.

Best Show of Trucks Ever Made.

The truck exhibits were collectively the best ever seen in Boston, from any point of view, and while most of the displays were limited in numbers because of the demand for space, the total exceeded that of any previous show. The exhibitors would have preferred to show series of trucks rather than a machine or two, but to have done this would have necessitated denying at least half of those who showed from the buildings and would have greatly reduced the value of the exhibition to the industry.

Five of the 69 makes of trucks shown are electric driven, of which three, the C-t, the Oneida and the R & L were seen for the first time in Boston. The last two are new products, the Oneida being constructed with a patent line drive, built to the Krohn patents, and is propelled by a single motor assembled with the transmission unit in the rear axle housing. Claim is made that this machine is particularly efficient and economical.

Three New New England Trucks.

There were three new New England made trucks, the Northway, built by the Northway Motors Corporation, Natick, Mass., which is in two and 3½-ton load capacities. These chassis have a special Northway engine developed especially for truck construction. The second is the Capitol, built by the Capitol Motors Corporation, Fall River, Mass., in one and 2½-ton ratings, and the third is the Walker-Johnson, produced by the Walker-Johnson Truck Co., Woburn, Mass.

Other trucks that were seen for the

first time at Boston are the Reynolds, the product of the Reynolds Motor Truck Co., Mt. Clemens, Mich., which is in four sizes to a standard design; the Ultimate truck, built by the Vreeland Motor Co., Newark, N. J.; the Traylor, shown by the Traylor Engineering & Manufacturing Corporation, Cornwells, Pa., as well as the All-American, Briscoe, Jackson Four-Wheel Drive, Jumbo, Master, Sandown, Sterling, Sullivan, Traffic, Transport and Winther and Winther Marvin trucks. Among the other interesting exhibits were the Walter suspended drive, a new feature of the well known Walter trucks, and there were numerous new products by old manufacturers, among which were the Federal one-tonner and the Paige 1½-ton truck.

There was display of truck bodies by three exhibitors, and a considerable number of construction units were shown, including Buda and Continental engines, Borg & Beck clutches, Cotta transmission gearsets, Clark axles, several makes of wheels and a considerable number of special types of equipment.

The three farm tractors were the Cle-

trac, the Fordson and the Traylor, the last-named being convertible into a cultivator, and there were the Beeman, Do-It-All, Merry Garden, New Britain, Tillermobile and Utilitor walking operated machines.

The display of accessories, equipment, supplies, etc., which was sanctioned by the Motor & Accessory Manufacturers' Association, was largely confined to individual exhibits of products rather than miscellaneous, such as might be made by the jobber or local dealer, and the demonstrations were much more interesting and convincing.

Some of the Social Events.

During the show there numerous events had been arranged by the dealers and sales organizations, all intended to promote cooperative effort and to enthruse the salesmen with the qualities and merits of the products they are selling.

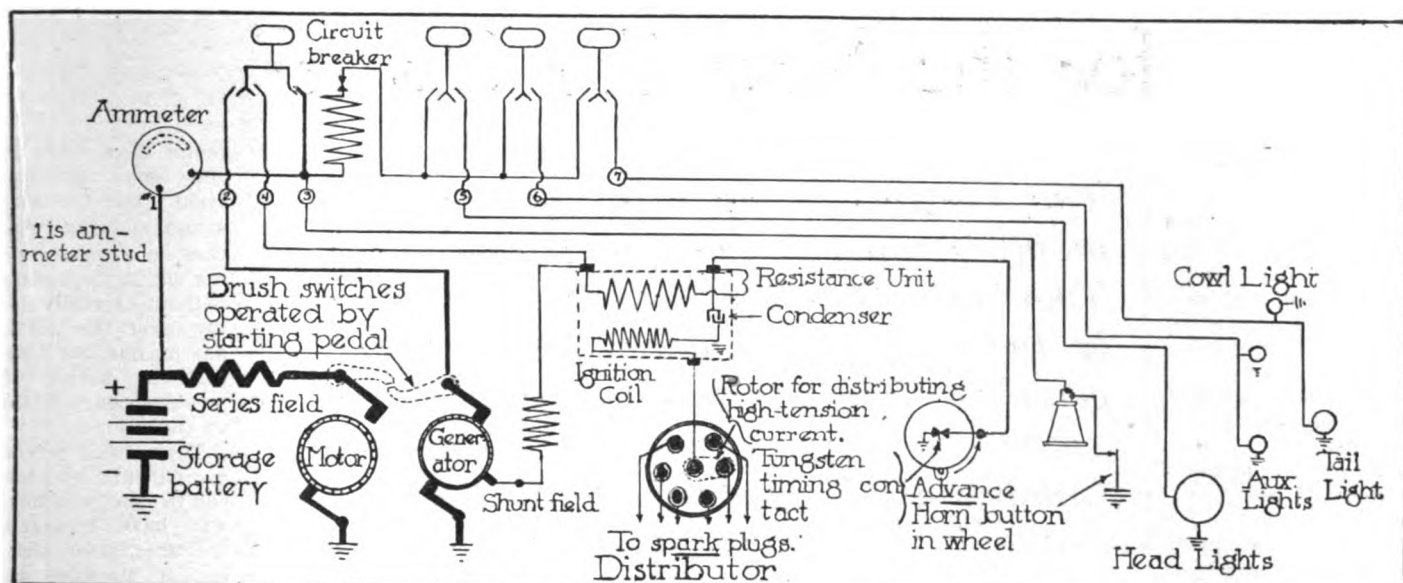
The Motor Truck Club of Massachusetts, an organization formed a few months ago to protect and promote the interests of truck manufacturers, distributors, dealers and owners, held its first annual banquet at the Hotel Westminster March 16, which was attended by upwards of 300 members and guests. The club now numbers 275 members, representing companies that own more than 3000 trucks. The presiding officer at the dinner was President James J. Scully, N. H. Halliday was toastmaster, and the speakers included John N. Cole, head of the State Commission of Public Works, and David Harper of Newark, N. J., who organized the original motor truck club of that city.

The other events of interest included the dinner given by the Nash Motors Co., at the Copley-Plaza, which was attended by Vice President C. B. Voorhis and Ellis Travey, the advertising manager for the company; a dinner given at the Copley Square by Charles R. Dunbar of the Oakland Motor Co. of New England to upwards of 100 dealers; a luncheon for Overland dealers at the Boston Athletic Club, and dinners for the Cadillac and Franklin sales organizations.

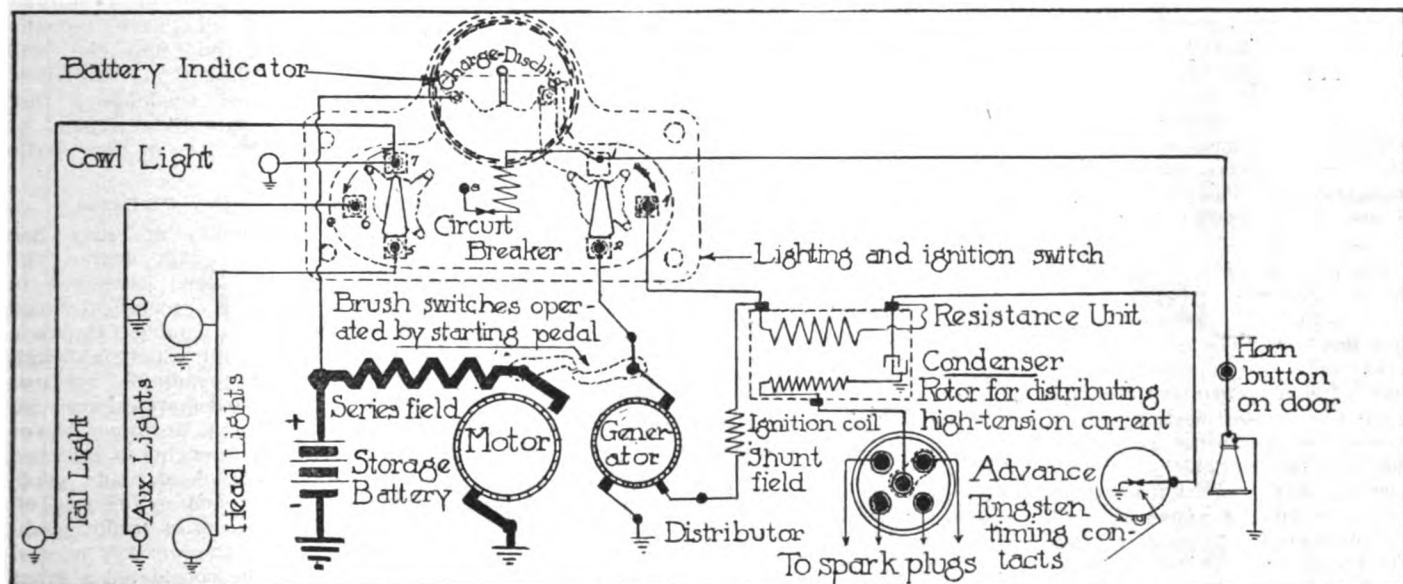


One of the Aisles in the Main Accessory Department on the Second Floor, in Which Unusually Effective Displays Were Made by Manufacturers.

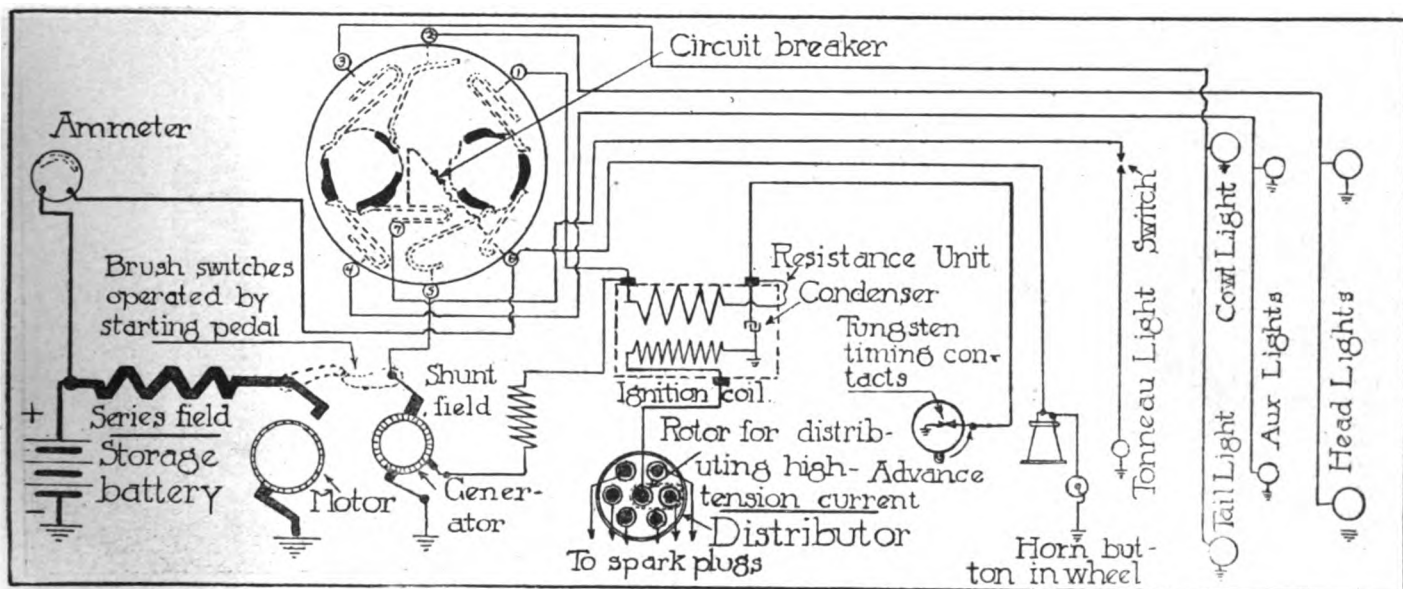
Monthly Wiring Diagram, No. 3



Buick Little Six 1916-17 D-44-45-46-47 Deleo One-Unit System.



Buick Little Four 1918 E4-34-35 Deleo One-Unit System.



Buick Six 1919-20 H-44-45-46-47-49-50 Deleo One-Unit System.

Points on Operation and Adjustment for the New Car Owner

THE warm days of spring are on the way and the highways and byways will again soon be thronged with thousands of motorists who have been impatiently waiting for the tedious ban of winter to be raised by the warm sunshine and balmy breezes. There will be a host of new drivers to take to the road this spring, and still many others who have traded in last season's car for one of the 1920 models. The new comers, whether driving a new car of the 1920 vintage or a used one that was overhauled to a greater or less degree before it was purchased, will quite naturally want all the information possible concerning the operation and adjustment of the various units that are apt to give trouble.

The purpose of this article is to assist the motorist who has recently purchased a car, whether it be a new one or one that has seen service, in remedying defects that may develop while on the road. The seasoned driver should not so much need these suggestions as may the novice, for the former should have been able, during the time he has owned and operated cars, to acquire from various sources a fund of knowledge relating to the automobile in general, that should stand him in good stead when trouble develops. The new motorist, on the

The Various Components of the Automobile Plainly Shown and Places Where Trouble Is Most Liable to Develop Clearly Indicated—Systematic Plan of Procedure to Remedy Defects Outlined, Together with Summarization of Abnormal Conditions, Their Probable Causes and Methods of Correction and Restoration

other hand, has everything to learn in this respect, and his smattering of knowledge is oftentimes gained from sources that may not have been altogether reliable. The object here will be to point out some of the common troubles that are liable to occur and the proper method of tracing and locating them in a systematic manner, such as would be used by a garage repairer, experienced in this class of work.

The motorist who is operating his first car may well be excused if trouble does develop on some of his first trips as he cannot be expected to have become thoroughly acquainted with the different units, and all the knowledge he has had a chance to gain has been from the salesman or demonstrator, or from a hazy study of the instruction book. When trouble occurs he is usually far from home, among strangers, and should in all justice be given a helping hand by passing motorists who have probably ere this

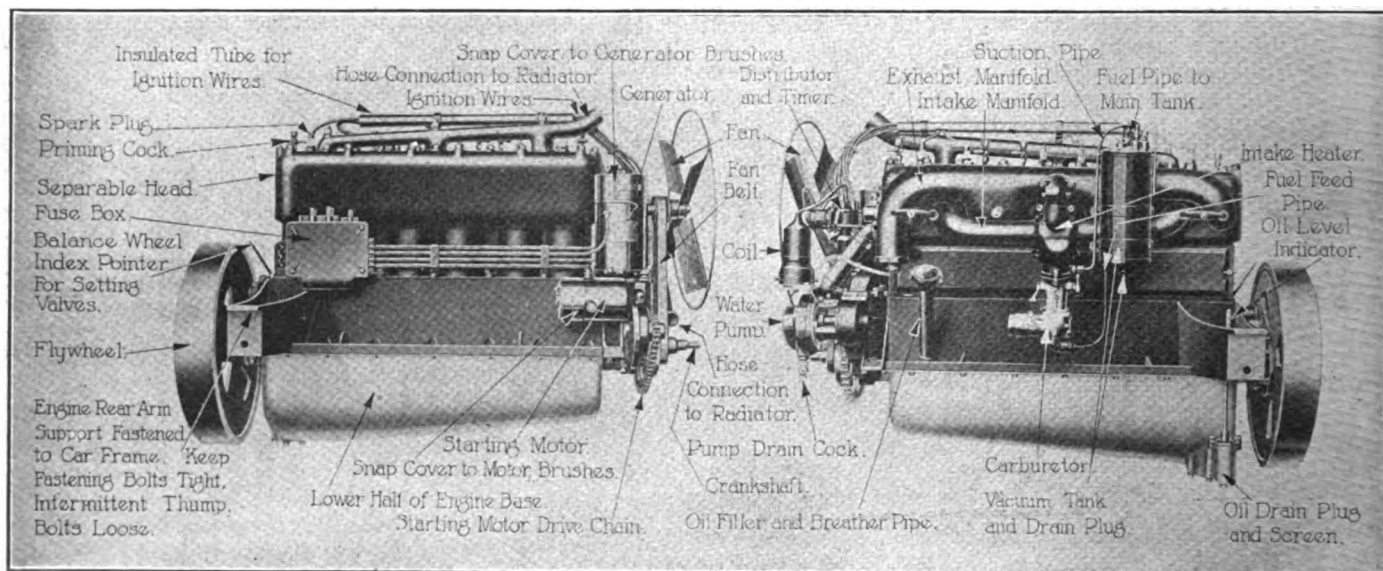
found themselves in the same predicament. But the seasoned motorist who carelessly takes his car out in the spring without carefully going over the units, has no one but himself to blame if trouble occurs while on the road.

The careful driver on putting up his car in cold weather, will have removed the tires, after jacking or blocking up the car, and stored them in a suitable

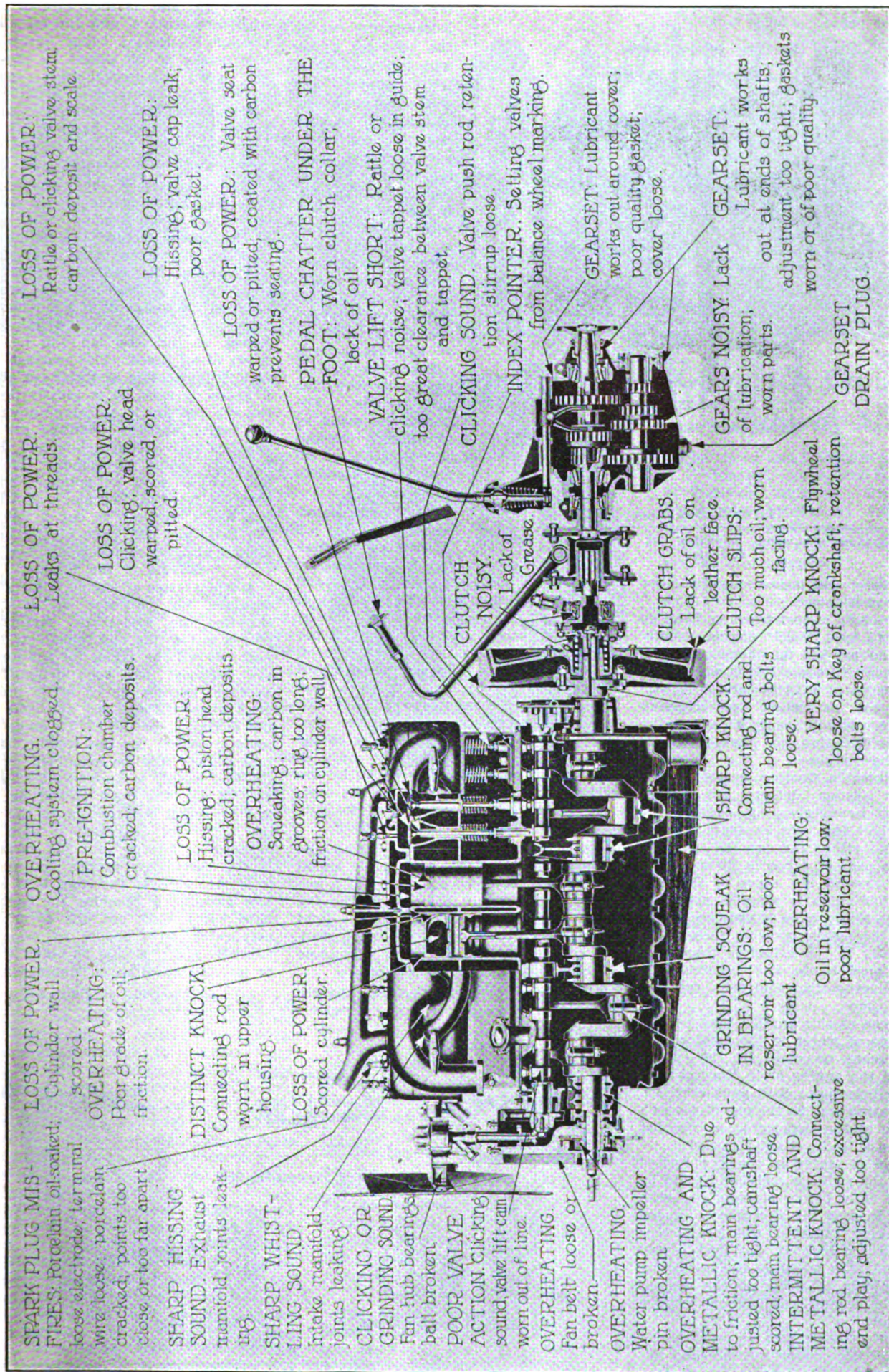
place. But those who have thoughtlessly left them on the car will probably find that, on inflation, they have developed weaknesses that will necessitate immediate repair, or quite likely, the purchase of new equipment.

Automobile Highly Perfected.

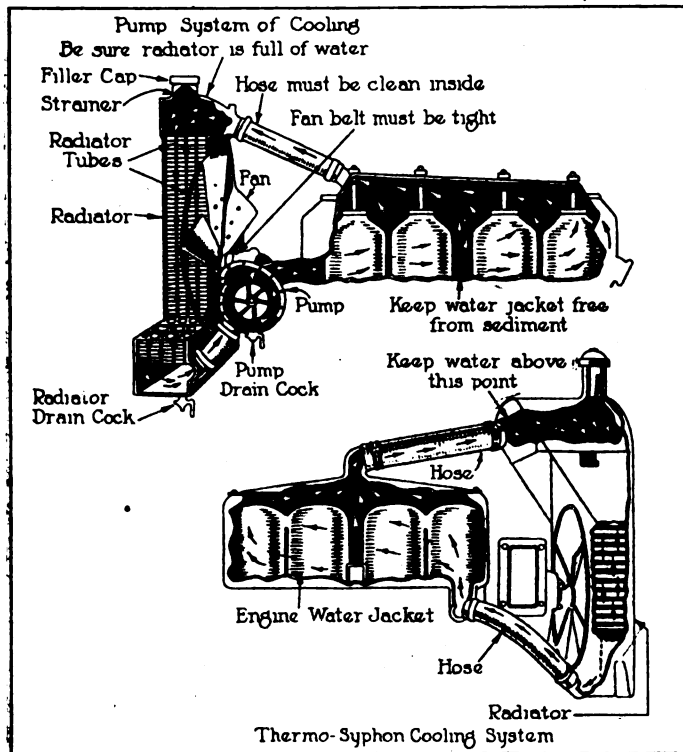
While the automobile of today has been perfected to a high degree, the mechanism has not been developed to the point where it is automatically and indefinitely free from trouble. Unlike a stationary power plant which, although mounted on a firm foundation, requires constant attention from an experienced engineer, to keep it up to proper power output the automobile engine is expected to travel over all kinds of roads, good, bad and indifferent, and to function efficiently under all sorts of traffic conditions, regardless of the weather or season. And it may be considered a great tribute to the skill and progressiveness



Modern Six-Cylinder Power Plant Showing Location of Units of Auxiliary System.



Modern Six-Cylinder Power Plant Showing Units of Engine, Clutch and Gearset Liable to Give Trouble and Defects and Causes.



Cooling System, Showing Location of Parts and Possible Defects.

of its designer that it does not give more trouble than it does.

The average motorist, when held up on the road by a "dead" engine, usually goes to the nearest telephone and calls a repair man to come to his assistance, when oftentimes a little careful consultation of the instruction book applying to his car would probably give him the needed information to enable him to remedy the trouble.

Defects in Cooling System.

Cooling system defects are usually manifested by overheating, causing the water to boil and turn to steam, forcing its way out either through the overflow vent or in case of a poorly fitting radiator cap, around the edges of the cap, still another effect is sluggish action of the engine, due to the expansion of the metal of the pistons causing them to fit more tightly in the cylinders than they were designed to do, and eventually to seize if overheating continues for any length of time.

The cause of this trouble may be due to shortage of water in the cooling system, sediment or scale in the water jackets of the engine or in the radiator, or poor lubrication. Still another cause of overheating may be the use of too rich a mixture at the carburetor, or running the engine with the spark retarded.

Shortage of water is easily remedied by filling the radiator and this should be inspected daily before starting out with the car. In case the shortage is caused by a leaking radiator, this component should be repaired at the first opportunity, and care taken in the meantime to keep plenty of water in the system so that the engine will have no chance to overheat.

Sediment or scale may be removed by drawing off the cooling medium and filling the system with a solution com-

posed of sal soda or lye and hot water. Running the car on the road for a day with this solution in the radiator and water jackets of the engine will loosen most of the scale and rust, and drawing off the fluid at night, rinsing out two or three times with clean water and refilling finally with clean water will remove practically all of the scale and sediment. Repeating this method at monthly periods will keep the system practically free from this trouble. The solution is made by dissolving one-half pound of lye or sal soda in five gallons of hot water.

Insufficient lubrication, or using oil of an unknown quality in the engine

reservoir is poor judgment at best and should not be tolerated. The purchase of the best oil obtainable and bought only of reputable dealers, will cure many of the lubrication troubles that arise. The oil in the engine reservoir should be drawn off, in the case of a new car, at the end of 250 miles; then at the end of 500 miles additional travel and after that every 1500 miles. The reason for changing the oil frequently is that more or less of the unburned fuel works by the pistons, mixing with the oil in the base, causes it to become thin and lose its lubricating qualities.

Light oil should be used during the colder months of the year, while an oil with a heavier body, preferably of a medium grade, should be used during the warmer months. An oil with a light body flows into the bearing more readily, lubricating them to better advantage than would a heavier bodied oil.

Engines of the air cooled type require

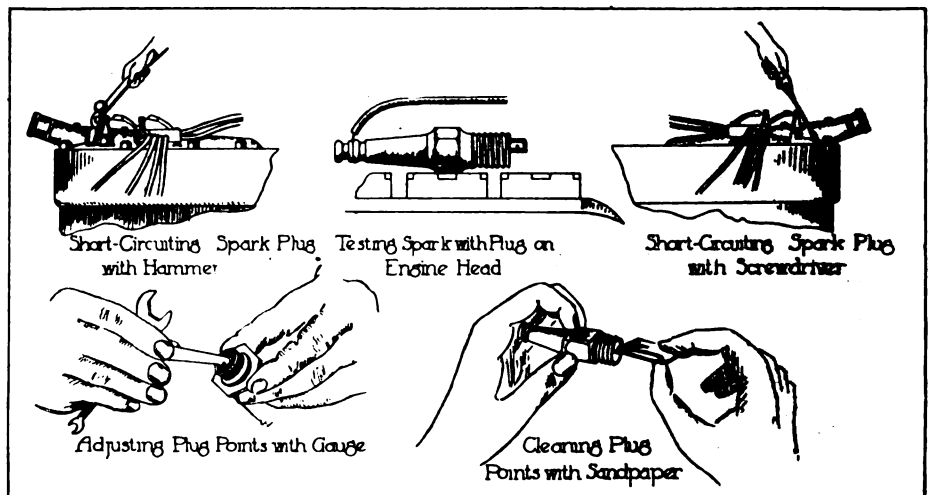
a much heavier bodied oil than do water cooled engines, as they operate under a high temperature, and the oil stands a greater chance of being burned. For this reason an oil should be chosen for air cooled engines that is especially adapted for that type. It should have a high fire test and be of such a body that it will lubricate the engine and its bearings thoroughly at all seasons of the year regardless of temperature.

The efficiency of the cooling system depends largely on the proper operation of the fan, which is mounted at the front of the engine, behind the radiator. Its function is to draw in fresh air through the core of the radiator, at the same time forcing a draft of air over and around the engine. Care should be taken to have the fan belt properly adjusted, so that the fan will be driven freely at all times. The bearings should receive lubrication at stated periods, and if grease is used, as is usually the case, the cup cap should be turned down often to insure that the bearings are being supplied with sufficient lubricant. Broken bearings should be removed from the fan hub as soon as noticed and new bearings fitted in their place, as a broken ball has a tendency to cut or gouge out the ball race and cone of the bearing, making ultimate replacement more costly.

Defects in the Engine.

A typical case of engine failure will be assumed for purposes of illustration, showing the systematic method employed in locating and remedying the defect. It will be taken for granted that the motorist has been driving at an average touring speed of 25 miles an hour when, without any apparent cause, the engine stops dead. To make a systematic search for the trouble, the gas tank should first be examined to see if the fuel supply is unexpectedly exhausted. If not, the hood should be raised and the small priming pin on the top of the carburetor depressed to note if the gasoline is flowing into the carburetor. If the carburetor primes and the fuel runs out and over the edge, it is evident that gasoline is reaching the carburetor bowl. If it does not, the cover of the carburetor bowl should be removed if possible, and it should be noted whether or not the gasoline is running into the

(Continued on Page 24.)



Testing Plugs by Short-Circuiting, Setting Points and Cleaning.

TIRE INDUSTRY AND TRADE

Activities of Portage Rubber Co.

Increasing business in Wisconsin and adjoining territory has resulted in the necessity for additional representation in that section of the Portage Rubber Co., Barberton, O. A branch has been opened at 450 Jackson street, Milwaukee, to aid in the greater distribution of Portage tires and tubes.

P. S. Manley, formerly salesman at the Portage Chicago branch, has been appointed branch manager. Mr. Manley has had considerable experience in the rubber industry, formerly being one of the leading salesmen of the Empire tire and later of the Brunswick. Six salesmen have been assigned to work out of this branch.

Announcement is also made by the Portage company of the appointment of F. N. Hammond as special representative of the sales department. Mr. Hammond is well known among tire men and has an extensive knowledge of the needs of the retail industry. He was formerly Goodyear branch manager in Cleveland for a number of years and later Kelly-Springfield branch manager in Detroit.

COMMERCIAL BALLOON SOLD BY GOODYEAR CO.

The Goodyear Tire & Rubber Co., Akron, O., has sold what is said to be the first lighter-than-air craft, built solely for commercial purposes, to a Kansas City, Mo., air ship syndicate, delivery to follow its exhibition at the New York aero show. This is called a "pony blimp" and is stated to be probably the smallest dirigible balloon ever constructed. It seats two passengers, has a speed of 40 miles an hour, and a range of about 400 miles. Its "ceiling" is about 6000 feet.

The western syndicate has not declared what use will be made of the air ship, but some of the commercial uses for which it is adapted are: Aerial mail transportation, harbor, coast guard and forest patrol, wheat and oil field survey, aerial photography and map making, express carrying and advertising purposes.

The "pony blimp" type of air ship was developed following the change from war to peace time activities of the huge Ak-



F. N. Hammond, Special Representative
Sales Department, Portage Rubber Co.

ron plant, where more than 1000 balloons have been turned out. Developed primarily for the sportsman, the little ship has a variety of commercial uses and will probably be the forerunner of the transcontinental and transoceanic types the company may build later.

But 95 feet in length, 40 feet in height and 28 in diameter, the "midget of the air" has a gas capacity of about 35,000 feet. The motor is four-cylinder, 16-valve, 40 horsepower, mounted as a "pusher." In trials the ship was found to have extraordinary maneuverability. New features are its ability to land on water, easy demounting of car and rudder, also its special mooring harness by which a few men can handle the ship on landing.

With firm faith in the future of airway travel, the Goodyear company has near completion another "pony blimp" of tractor type, which will be shown for the first time at the San Francisco aero show in April.

The United Tire Co. has opened a branch at 88-90 East Tupper street, Buffalo, N. Y., and has been appointed distributor for Firestone truck tires. A. E. Henry is manager.

Goodrich Co. Makes Highway Maps

The travel and transport bureau of the B. F. Goodrich Co., Akron, O., has a force of highway engineers, draftsmen and topography experts at work preparing one of the most extensive systems of maps and charts of America's highway system ever compiled.

During the war period the bureau was called on to lay out routes for the army military convoys and since then a country wide survey has been conducted. The exhaustive data and material gathered has enabled the compilation of routes connecting all centers of population in the United States.

In the event of other national emergencies the resources of the Goodrich bureau will be available to government, state and county authorities.

The preparation of maps is but one step in the bureau's programme to assist in establishing rural motor express lines in every community in the country where there is need for this service.

LONG-WEAR RUBBER CO. EXPANDS BUSINESS.

The stockholders of the Long-Wear Rubber Co., Elyria, O., have voted to change its name to the Long-Wear Tire & Rubber Co., to increase its capital from \$500,000 to \$5,000,000, divided into \$700,000 preferred and the balance common, and to take over the business of the Quality Tire & Rubber Co., Anderson, Ind. The general offices of the Long-Wear Tire & Rubber Co. are to be moved to Anderson, Ind., and a large addition to the Elyria plant for making cord tires is to be built.

Under the new arrangement the Elyria plant will have a capacity of 300 Long-Wear cord tires a day and the Anderson plant 1000 fabric tires and 2000 tubes a day in addition to a complete line of Anderson Quality fabric tires and special brands for jobbers.

The general management of the Long-Wear Co. will remain in the hands of Frank W. O'Brien.

NINIGRET MILLS WILL MAKE TIRE FABRIC.

The Ninigret Mills Co., which has succeeded the Greene & Daniels Co., Pawtucket, R. I., has been incorporated with a capital of \$3,000,000, divided into \$2,500,000 preferred and \$500,000 common stock, and will manufacture automobile tire yarns and fabrics.

The officers include: President, J. A. Brander, Brander & Curry, Inc., New York City; vice president, Charles F. Broughton, treasurer of the Wamsutta Mills, New Bedford, Mass.; treasurer, H. T. Fiske, Fiske Rubber Co.; first assistant treasurer, Henry Otte; second assistant treasurer, Charles S. Fowler; secretary, Arthur Houghton; clerk, John E. Searle. The Pawtucket plant will be under the management of Mr. Otte.

A second plant, the Ninigret mills, at Westerly, R. I., already equipped with twisting, spooling and weaving machinery, is to have 20,000 spindles added and will be in charge of Mr. Fowler. Both plants are to be overhauled and equipped with up-to-date machinery for tire fabrics.

OAKLAND HAS COAST COMPANY.

One of the most recent tire concerns to begin operations in California is the Coast Tire & Rubber Co., which has purchased a factory site in Oakland. Production plans call for a plant having a capacity of 300 tires and 500 tubes per eight-hour day. Its capital is \$1,000,000.

The chief organizer of the Coast company is Holmes Ives, formerly secretary and sales manager of the Boone Tire & Rubber Co. Interested with Mr. Ives are Harold Geisse, assistant to the vice president of the Middle West Utility Co. of Chicago; W. D. Forbes, an industrial chemist of many years experience; N. B. Campbell, assistant cashier of the First National Bank, Oakland; N. J. Whelan, industrial commissioner of the Wisconsin-Minnesota Light & Power Co., president of the United States Auto Gear Shift Co., and director of the Gillette Tire & Rubber Co. of Wisconsin; John P. Pancratz, sales manager for eastern Wisconsin of the Boone Rubber Tire Co.

PERFECTION CO. TO USE OWN BRAND.

It is reported that the Perfection Tire Co. is now concentrating its efforts upon the production of tires and tubes carrying its own brand, having abrogated its contract with the Keystone Co. so as to meet production requirements under its selling arrangement with the Nemours Trading Corporation.

MUTES IN THE RUBBER INDUSTRY.

Persons who are deprived of speech have been found to be specially adapted to certain classes of work in the rubber industry, and the number employed at Akron alone is nearly 1000. In fact, in some of the larger factories entire departments consist of mutes, and their work is said to be of a high standard.

Firestone Company Vice Presidents



Thomas Clements, Vice President, Firestone Tire & Rubber Co., in Charge of Offices and Purchases.



A. G. Partridge, Vice President, Firestone Tire & Rubber Co., in Charge of Sales.

THE Firestone Tire & Rubber Co., Akron, O., recently made some important additions to its board of vice presidents in keeping with its policy of maintaining the efficiency of its organization to the highest point possible and the substantial recognition of worth and loyalty on the part of its employees. Thomas Clements has taken charge of offices and purchases, A. G. Partridge has direction of sales, L. G. Fairbank becomes a vice president and manager of the Firestone Steel Products Co., a subsidiary of the Tire & Rubber Co., and J. W. Thomas has oversight of the manufacturing end of the Firestone Tire & Rubber Co.

Mr. Clements joined the staff of the Firestone Co. about two years ago as comptroller, coming from the position of

general manager of the Woods Motor Vehicle Co.

Mr. Fairbank became eastern sales manager three years ago, after three years in the advertising department, during the latter two of which he was assistant advertising manager.

Mr. Partridge, who becomes vice president in charge of sales, came to the company in its infancy, growing up to be general sales manager, which position he has held for some time.

Mr. Thomas has been works manager for some time. He has been associated with the Firestone organization for 12 years, having been responsible for production since 1911.

In this connection it may be noted that the Firestone company is now using 35,000 tons of rubber annually.



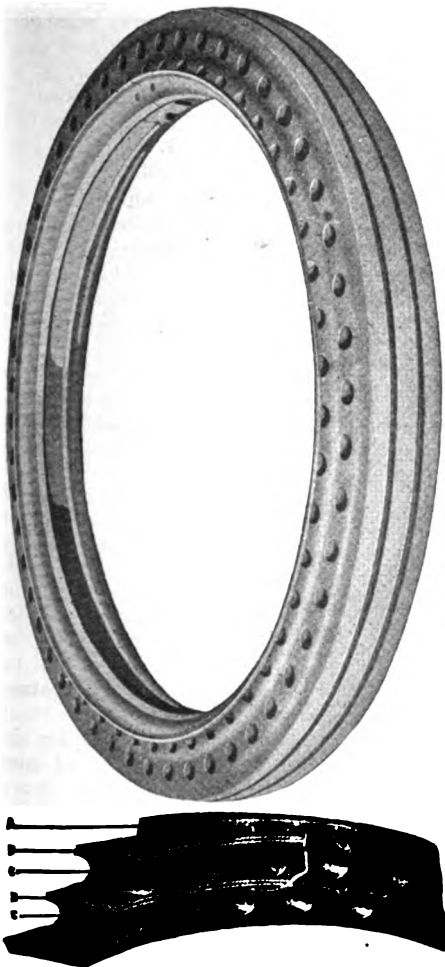
L. G. Fairbank, Vice President and Manager, Firestone Steel Products Co., Subsidiary of Firestone Rubber Co.



J. W. Thomas, Vice President, Firestone Tire & Rubber Co., in Charge of Manufacturing.

LAMBERT TIRES HELP MAIL DELIVERY.

A new type of trouble proof tire, the product of the Lambert Tire & Rubber Co., Akron, O., it is claimed, was an important factor in establishing a record in handling mails during the holiday rush at the Peoria, Ill., postoffice. As measured by the government standard the service in that city was rated perfect, and the authorities there give much credit to the tires with which the trucks were equipped, which enabled them to run day and night without any of the delays occasioned formerly by tire trouble.



Lambert Trublipruf Tire with Cross Section Showing Construction.

This tire, the name of which, "Trublipruf," has been trade marked by the Lambert company, is built about a stretchless cord belt. It contains no inner tube and requires no air inflation. The construction of the tire is said to be an unusual adaptation of the well known principle of cable cords. Stretchless cord belts and rubber cushions, C, take up road shocks and distribute them as air does in a pneumatic. So tight and stretchless are the cord belts that they respond to a touch like a violin string—they vibrate along their entire circumference. Road shocks are, therefore, distributed clear around the tire. This is stated to be the secret of its easy riding qualities.

The actual functioning of the cord belts and rubber cushions is as follows: When the tire goes over a bump the cord

belts are pushed up at the point of contact. As a result the belts, being stretchless, pull down upon the rubber cushions all around the tire. The rubber cushions are compressed and their resiliency takes up the shock and deadens it like air. The holes in the tire vary from round to elliptical, while it is in motion, showing that the function is in this way. A peg may be driven solidly into one of the holes and will be dislodged after a block or two of going.

The inventor of the "Trublipruf" tire is H. M. Lambert, president of the Lambert Tire & Rubber Co. Mr. Lambert, after some years of experimenting in the Pacific northwest, built a factory at Portland, Ore.; then another at Akron, O. Now to meet demands he is remodeling his Akron plant so as to double its production.

GOODYEAR WELFARE PLANS.

Many of the large companies of the country having the welfare of their employees at heart have promulgated plans for reducing the cost of living. The Goodyear Tire & Rubber Co., Akron, O., recently purchased and sold at low prices to its employees, 10 tons of navy beans, 500 cases of corn, 400 cases of baked beans and 250 cases of corned beef.

This company has also recognized the importance of good physical condition on the part of its workmen, by establishing classes in systematic physical training which are held three times a week during the winter season.

FOREMOST CORD TIRES.

The United Motors Service is now ready to distribute to tire dealers through its branches the Foremost cord tire, which is built to the exclusive specifications of the company.

The United Motors Service maintains branches in 22 cities and has 150 authorized distributors, for handling high grade automotive equipment and furnishing service on Delco, Klaxon and Remy products.

TIRE COMPANY AT ST. LOUIS.

A tire manufacturing company, to be capitalized at \$3,000,000, has been organized by a group of St. Louis and Chicago men and will at once begin the construction of a factory on the site of the Autenreith hotel, St. Louis.

NEW MANAGER FOR BALTIMORE MCGRAW BRANCH.

L. L. McAnaney, who has been appointed manager of the Baltimore branch of the McGraw Tire & Rubber Co., Cleveland, O., is one of the best known tire men in the country, having been identified with the industry for the past 17 years.

Mr. McAnaney started as a stenographer in the factory of the B. F. Goodrich Co. at Akron, O., and was rapidly advanced, being at first salesman in the Boston territory, and later manager of the Goodrich Co.'s branch at Cleveland, O., which position he held for nine years.



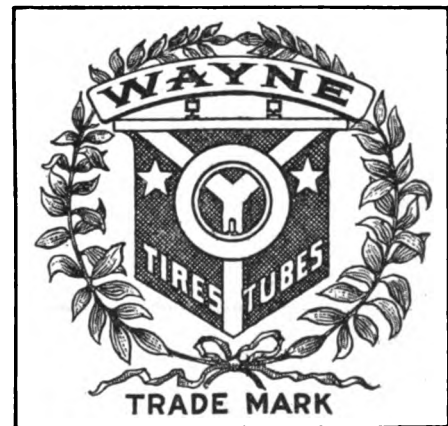
L. L. McAnaney, Manager Baltimore Branch McGraw Tire & Rubber Co.

For four years previous to his engagement with the McGraw Co. he was manager for the Republic Rubber Co., Youngstown, O.

He is sure to receive substantial recognition for his company in the Baltimore territory.

FORT WAYNE CO.'S NEW TRADE MARK.

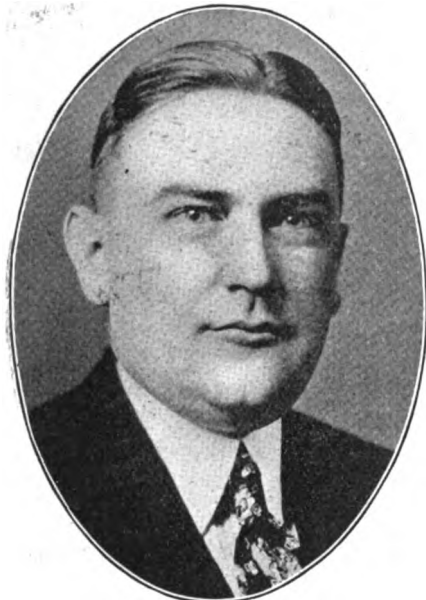
The Fort Wayne Tire & Rubber Manufacturing Co., Fort Wayne, Ind., has adopted a new trade mark which will be used on all its products, molded in the tires and printed on the tubes. The design consists of a wreath of the leaves of the rubber tree surrounding the two-starred flag of Fort Wayne, which has been adapted to form a shield, the device signifying the unification of three rivers. An automobile tire holds the center of the design. Surmounting the shield is the word "Wayne" and below on the extreme bottom are the words "Tires" and "Tubes" at the left and right respectively. This is the \$100 prize winning design submitted by Walter Johnson of South Bend and A. L. Callahan of Fort Wayne, Ind. This company produces both the Wayne cord and fabric tires. The general manager is Vice President J. C. Brown and the secretary and treasurer is L. E. Kraft.



Recent Firestone Promotions

PRESIDENT H. S. FIRESTONE of the Firestone Tire & Rubber Co., Akron, O., has announced the following promotions:

E. W. BeSaw, who has been western



E. W. BeSaw, General Sales Manager, Firestone Tire & Rubber Co.

sales manager for three years, with headquarters in Akron, is made general manager, succeeding A. B. Partridge; F. K. Starbird, district chief, with headquarters at Minneapolis, Minn., becomes western sales manager; J. E. Mayl, district chief at Boston, is made eastern sales manager.

Mr. BeSaw joined the Firestone forces nine years ago as a salesman in Iowa. In a short time he had become manager of the Des Moines branch and on account of his fine record was called to the general offices, where he soon became manager of the western sales division. Mr. Starbird became associated with the Firestone organization four years ago in the advertising department. Before becoming a district manager a year ago he was sales manager of the pneumatic department. Mr. Mayl started with Firestone in 1911 as a salesman in St. Louis. Four years later he was placed in charge of the Memphis branch. He was manager of the Cleveland branch from the spring of 1917 until he became a district manager last year.

GOODRICH PLANS TO INCREASE CAPITAL.

The proposed extensive financing plan of the B. F. Goodrich Co., Akron, O., to provide increased working capital to take care of the company's greatly expanded volume of business, has been announced to include the proposed issuance of \$30,000,000 of five-year seven per cent. gold notes convertible into common stock at \$80.

Stockholders are to vote on this proposal at a meeting to be held March 10.

GOODYEAR CO. ESTABLISHES MINIMUM WAGE SCALE.

The Goodyear Tire & Rubber Co., Akron, O., announces the establishment of a minimum day wage scale of \$6 for all male factory employees who have been employed continuously for six months or more, and of \$4 for female employees. In addition pay increases of approximately 10 per cent. on hourly rates and from five to 12 per cent. on piece work, will become effective March 16 under the same conditions. About 25,000 will be benefited under this plan.

Additional requirements to enjoy the new schedule are that workers must be American citizens, able to speak the English language and more than 18 years old.

HEWITT RUBBER'S SELLING POLICY.

The Hewitt Rubber Co., Buffalo, N. Y., through its vice president and general manager, John N. Kelly, has inaugurated a selling policy through distributors only and carries warehouse stocks at New York, Chicago and San Francisco. A contract has just been closed for north-



J. E. Mayl, Eastern Sales Manager, Firestone Tire & Rubber Co.

ern California with the Weinstock-Nichols Co. The Hewitt company is now producing about 500 tires a day.

AJAX RUBBER EARNS \$11 A SHARE.

The annual report of the Ajax Rubber Co., New York City, of business for the past year shows a net income after deduction of federal taxes of \$2,201,267, equivalent to \$11 a share earned on the \$10,000,000 (\$50 par value) stock, as compared with \$1,215,368, or \$8.55 a share on the \$7,100,000 outstanding capital in 1918.

PLATT TO LEAVE FISK CO.

Claude Platt, who for 14 years has been with the Fisk Rubber Co., Chicopee Falls, Mass., in various capacities, has resigned to enter the retail automobile business in Chicago, his home city.

Pennsylvania Co's Annual Meeting

At the annual meeting of the stockholders of the Pennsylvania Rubber Co., Jeannette, Pa., the following directors were elected:

Herbert DuPuy, H. Wilfred DuPuy, Charles M. DuPuy, Seneca G. Lewis, George W. Daum.

The directors subsequently elected the following officers: Chairman of the board, Herbert DuPuy; president, H. Wilfred DuPuy; vice president, Charles M. DuPuy; vice president-general manager, Seneca G. Lewis; assistant general manager, George W. Daum; treasurer, A. H. Price; secretary, George W. Shiveley; general sales director, James Q. Goudie; assistant treasurer, C. G. Morrill; purchasing agent, H. H. Salmon.

Mr. Lewis completed on Feb. 1 10 years service with this concern and on recommendation by the board of directors and approval of the stockholders, he will be retained for another fixed period in the office of vice president and general manager.

Mr. Lewis informed the stockholders and directors that it would be his plan, as heretofore, to build the business from the inside out, moving men and women up from the ranks as far as possible, and with reference to expansion, its past policy of building out of earnings will be maintained. It is the idea of Mr. Lewis that plants should be built to take care of the demand. He is not in favor of expansion which contemplates the building of a plant and then going out for business to run it. Development will be rapid, but under a policy insuring absolute safety to the stockholders.

Manager Lewis predicts that within another five years the entire tract of land recently purchased, comprising more than 200 acres, and extending from the plant of the Pennsylvania Rubber Co. to the Lincoln highway, will be dotted with hundreds of homes of employees.



F. K. Starbird, Western Sales Manager, Firestone Tire & Rubber Co.

Industrial Assembly Established at Goodyear Plant

A NEW departure in the method of establishing more friendly relations between the management and employees of a big industry has been successfully tried out for six months by the Goodyear Tire & Rubber Co., Akron, O., where an industrial assembly composed of 20 senators and 40 assemblymen, chosen from the ranks of 25,000 workers, pass all laws affecting the conduct and welfare of the men.

So satisfactory has been the work of this body during its brief existence in settling incipient strikes and improving working conditions of employees in various parts of the company's plant, that plans are now being made to provide a legislative hall in the new million dollar club house that will be finished early in the year.

representatives of the employer and the house composed of factory representatives. This tends to a deadlock and no solution of a problem.

Excellent Results Attained.

Commenting on the excellent results so far attained by the assembly, F. A. Seiberling, president of the company, declared in a recent address to employees, "it is hard to conceive that any of the recommendations of the assembly will be denied by the board of directors."

At the time of his address the assembly had already enacted laws providing for Saturday half holidays in all departments. A "tardy" rule which "docked" the men an hour and a half for being late was modified so that they now lose but 15 minutes. Unusual traffic conditions exist and make it difficult to report on

pany's preferred stock when 17,101 employees subscribed to \$7,700,000 worth of stock. This gives Goodyear the largest number of employee stockholders of any company in the world with the exception of the United States Steel Corporation.

Civic Betterment.

The assembly also participates in movements for civic betterment. Unanimous indorsement was recently given to several bond issues to provide for a tuberculosis sanitarium, a new viaduct and \$6,000,000 for improving the city water system.

Election rules governing the assembly provide that the factory be divided into 40 precincts. Each precinct elects one member to the assembly, called a representative. He shall not be less than 21 years old and have a continuous factory



E. J. Hard, President of Senate, Goodyear Industrial Republic.



P. W. Litchfield, Vice President of Goodyear Co., Acts as President of Industrial Republic.



J. B. Long, Speaker of House, Goodyear Industrial Republic.

The new assembly functions in the same manner as state and national legislatures. The seating arrangement in each house will be the same as that in the national and state capitols. Each will have a rostrum, desks and galleries for spectators and members will make all arguments under the rules of parliamentary law.

E. J. Hard is president of the senate and J. B. Long is speaker of the house. Both are from the ranks of the employees. P. W. Litchfield, vice president and factory manager, stands in the same relation to the assembly as the President of the United States to Congress. The power of veto is vested in him, but the assembly can pass any measure over his veto by a two-thirds vote. A measure so passed goes to the board of directors of the company for final decision.

There are many similar plans of handling labor problems in operation in many industrial concerns throughout the country, but the Goodyear plan differs in the fact that members of both house and senate are representatives selected by employees, whereas in many other concerns the senate is composed of repre-

time. This latter rule greatly impressed the workers with the efficiency and power of the assembly for proper corrective measures. The assembly's power was evidenced recently when complaints and requests for better trolley service were made by Goodyear to the traction company. No results were obtained. When the assembly representing 25,000 workers made the request immediate action was taken by the trolley company.

Laws making all shifts permanent have been enacted. Legislative action has been taken to adjust several threatened strikes.

When a machinists' strike was called in Akron recently, only 40 per cent. of Goodyear's machinists responded. In a few weeks they returned to work. All were returned to their old jobs by the assembly without being penalized, thereby cementing the relationship between the men and the company.

That the assembly is perhaps the nearest possible approach to an "Industrial republic," and that Goodyear has the confidence and interest of its workers was evidenced in the recent sale of the com-

record of one year. The term is 12 months.

The precincts are further arranged into 10 districts, each district electing two senators who serve for a two-year period. Candidates for this office must be not less than 25 years old and have a continuous record of five years in the factory.

The voters are called industrians. An industrialian must have a continuous record of at least six months in the factory, must speak English and be an American citizen.

Oath of Office.

The industrial republic plan was approved and adopted by a vote of employees in June, 1919, and the first election was held a few weeks later. Each new official, upon entering into office, took the following oath: "I solemnly swear that I will faithfully support the constitution and laws of the United States and the State of Ohio, the industrial representation plan of the factory, and that I will discharge to the best of my ability, faithfully and conscientiously, the duties incumbent on me as a member of the assembly."



Members of the House of Representatives, Goodyear Industrial Republic, Akron, O.

The plan also guarantees that there shall be no discrimination against any Goodyearite on account of membership or non-membership in any labor organization, or against any member of the assembly for action taken by him in performance of his duties as outlined in the plan.

It is expressly stated that the assembly shall have the right to change factory rules and regulations which from time to time have been made by the management.

This body has already promoted conferences between committees named from its own bodies and representatives of the management. While the body does not meet until the first Monday of each month, certain of its officers and committees are in weekly conference with the factory manager and executive heads.

Bosses Eliminated.

One noticeable effect in the six months operation of this unique legislative plan has been the elimination of the old-time slave-driving shop boss. The conduct of the harsh foreman is always a subject of review in the assembly upon complaint of an industrialian. Where before production was quickened under the watchful eye of a not too lenient overseer, it is now speeded up by the hope of reward and the promotion that follows in the wake of initiative and good work.

Of all plans tried by the company to promote industrial relations the assembly plan is believed by Goodyear to be the best. Frank and open discussion of all things relating to the employees' welfare can be brought before the management at a moment's notice.

The industrial assembly frequently invites the officials of the company to speak to them as well as outsiders. Anyone can attend a meeting, but the sessions are in no way dominated by officials. In fact they seldom attend unless invited. Recently Lillian Russell and Ole Hansen, former mayor of Seattle, spoke to the assembly. The reason for securing these speakers is that the assembly members may keep in touch with the best modern thought for improving the conditions surrounding workers.

Tax returns from Cleveland, O., show that the motor industry leads there.

Uses for Old Rubber Inner Tubes

All motorists, and that term now includes many thousand farmers, accumulate damaged or unserviceable tire tubes. What to do with them is a question. But these old tubes can be used to give excellent and varied service.

If cut crosswise in widths from a quarter to a half inch, excellent rubber bands can be made. They may be used in numerous ways, as for holding the pages of note books, or for holding rubber tubes that have been repaired and are carried in the automobile. They may be used for holding the covers of tin boxes filled with small drills, cotter pins or nuts. They also serve for securing small bundles. Various other uses will suggest themselves to the owner. Being so much larger and heavier they are much more useful than the bands usually sold in stores.

Pieces of tubes may be cut with scissors and used for washers for various purposes. These washers will not last as long as washers made for general use, but considering what they are they give

service for quite a while. Occasionally the nozzles on spraying outfits will not fit tight and a washer cut from an old tube will serve an emergency purpose and perhaps will save a special trip to town or to a store when work is pressing.

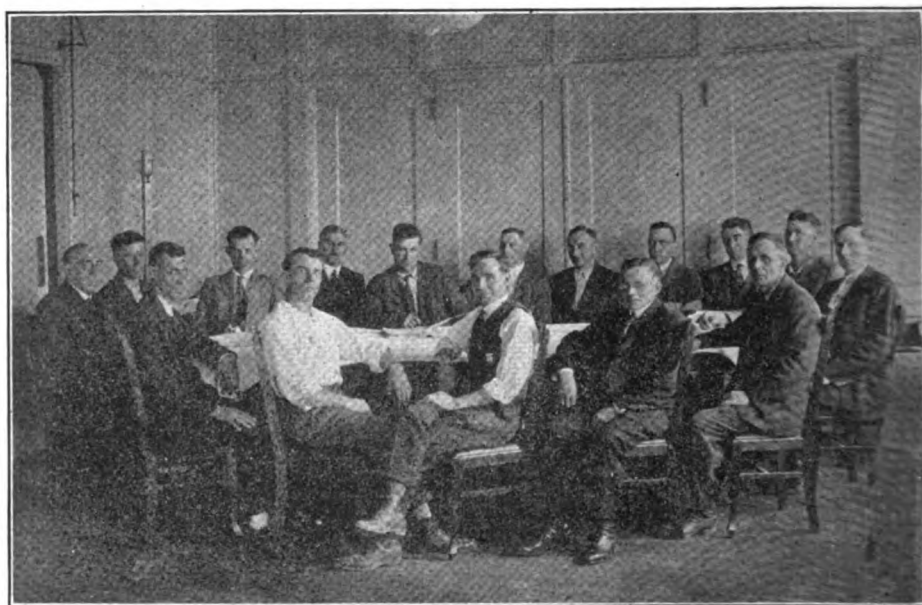
By starting at the end, cutting spirally round tube, one can get as long a strip of the rubber as one wants. These strips may be used to wind hammer and ax handles and iron lever handles on farm implements. Put on some rubber cement on the handles and then wind on the strips of rubber, being careful to keep them stretched fairly tight. There is a little trick to tucking the last end under the last "two times around," but after one handle has been wrapped the others are done easily. These wrapped handles do not blister the hands and the rubber wrapping will be found preferable to wrapping with adhesive tape.

Pieces from an old tube may be used for patching with a vulcanizer if the motorist does his own vulcanizing. The writer has used such patches for vulcanizing and found them very satisfactory. The purchased rubber is better, but in an emergency these pieces of tube may be used. Care should be taken, however, to trim the edges on a bevel so that after the patch has been cured the edges will not chafe the casing.

Have the surfaces clean on both sides. Wash with a cloth dipped in gasoline and then sandpaper them thoroughly. If one does not have sandpaper a fairly good job may be done with an ordinary file or a whetstone. These have given as good results as sandpaper or emery cloth.

By all means save the valve stems. Some times a valve stem is damaged and must be discarded. The valve stem out of an old tube can be inserted, cemented, then fastened by the wing nut and lock nut, and the tube will be as good as it ever was.

Since 1917 the number of cars in southern states has increased over 100%.



Senate of Goodyear Industrial Republic in Session at Company's Plant in Headquarters at Akron, O.

HUMOROUS SIDE OF MOTORING

SHADE OF ROOSEVELT!

The president of a well known motor truck company made public the following offer at a New Year's party given to its employees:

1. To any employee of the United States Motor Truck company who has a male baby born during the year of 1920, the company will give cash \$50.

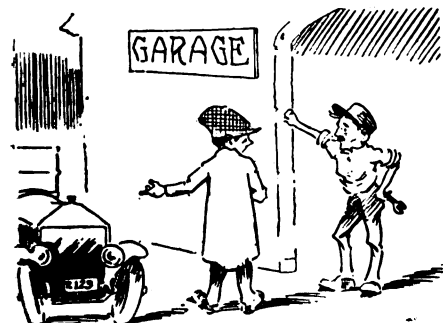
2. To any employee who has twins born during the year 1920, of either sex, the company will likewise give the sum of \$100.

3. Should any employee have triplets during the year 1920, the sum of \$400 will be given.

A MINORITY SHAREHOLDER.

"How much?" asked the wearied automobile owner of the garage proprietor as he dug down and extracted his wallet.

"Ninety-one dollars and eighty-six cents," was the cold reply. The owner paid. "I suppose," he remarked sarcastically,



"that I still retain a half interest in the car, do I not?"

JUSTLY INDIGNANT.

"Blankety, blank, blank these corporations, they don't care anything about the public," raged a man who drives his own car.

"What's the trouble now?" someone sympathized.

"The street railroads! They haven't got their tracks cleared out and I find it almost impossible to get around in my car."

YOUNG LADY ACROSS THE WAY.

She thinks the whole race question could be satisfactorily settled simply by making automobiles so they can't run over 15 miles an hour.

GOT HIM ON HIS FEET.

Redd: "The doctor said he'd have me on my feet in a fortnight."

Greene: "And did he?"

"Sure. I've had to sell my automobile."

THROUGH THE STORM.

"How did you get home, John?" she asked.

And John replied: "By the aid of six trolley cars, five transfers, four hours' time, an auto and \$11.30."—Brooklyn Standard Union.

IN A LIMOUSINE.

Muriel—I like a man with some go to him, don't you?

Ethel—Yes, if he takes me along.

IRREVERENT BUT EXCUSABLE.

The young hopeful was much interested in a picture of Elijah going to Heaven in a chariot. Noticing the halo



about Elijah's head, he exclaimed: "Look, mama, he's carrying an extra tire."—The American Legion.

THE CHAUFFEUR'S VIEWPOINT.

"So you find pedestrians very careless?"

"They're the limit. The last fellow I ran over ruined one of my tires. He must have been carrying a package of tacks in his pocket."—Browning's Magazine.

WHY IS IT?

Uncle Sol, the grocery store philosopher, wants to know why it is that a rich man usually has a Twin Six while a poor man has six twins.

SCENERY APPRECIATED.

"How about that beautiful lake country of the poets? They say it is fine."

"It is. There we averaged 16 miles to the gallon."—Louisville Courier-Journal

BOTH ZIGZAGGING.

The somewhat monotonous sessions of the average city police court are sometimes enlivened by a touch like the following:

A chauffeur was brought in after having run down a pedestrian.

"Did you know that if you struck this pedestrian he would be seriously injured?" the judge asked.

"Yes, sir," replied the chauffeur.

"Then why didn't you zigzag your car and miss him?"

"He was zigzagging himself and out-guessed me, your honor," was the answer.

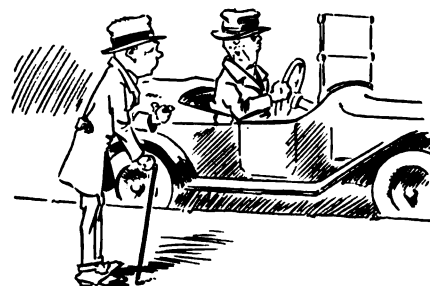
WHY DID SHE LAUGH?"

"Those hills," said the tourist, "are too steep for even a donkey to climb, so I'm not going up them."

Then he wondered why the girl laughed.

"NUF SED!"

"Did anybody comment on the way you handled your new car?"



"One man, but he didn't say much."

"What did he say?"

"All he said was \$50 and costs."

MORE UP-TO-DATE.

"Any old fashioned horse thieves around Crimson Gulch?" asked the visitor in quest of adventure.

"No," replied Cactus Joe. "The hoss thieves have all gone East an' took to stealin' automobiles, which is less risky and more remunerative."—Washington Star.

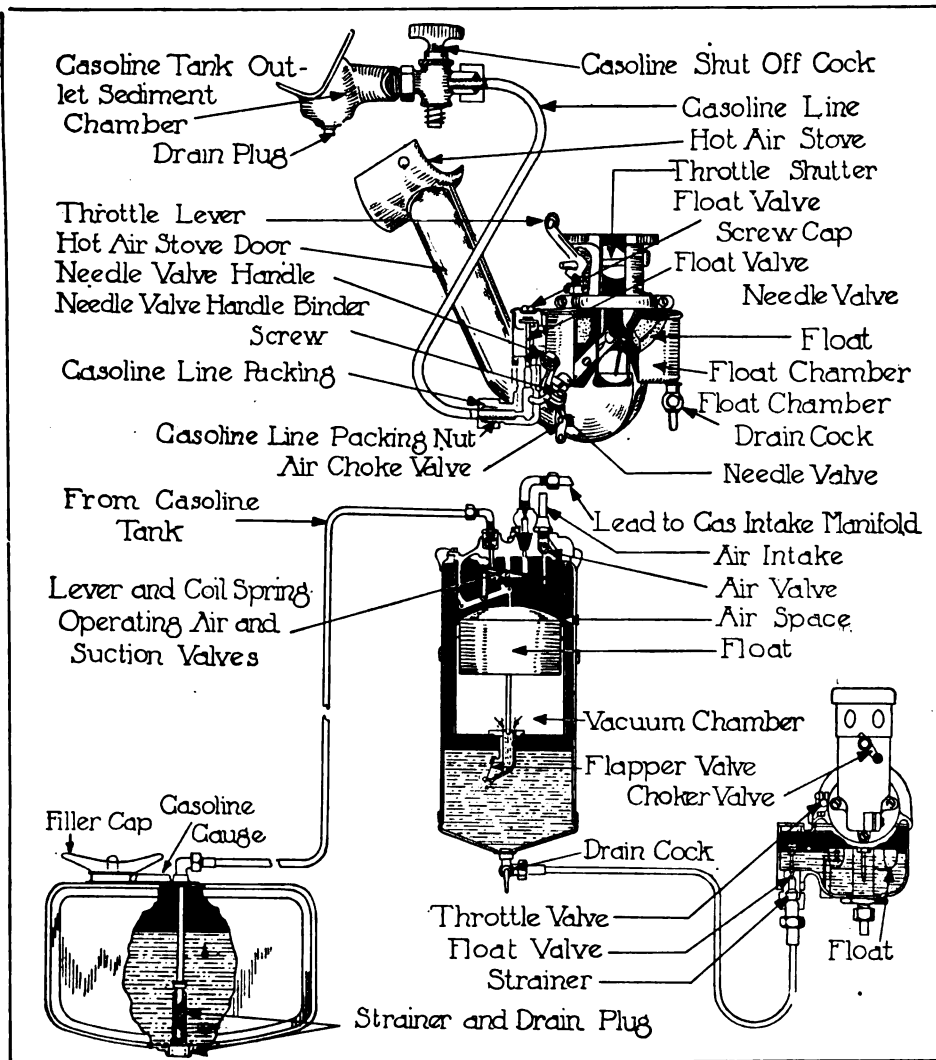
PRESCRIPTIONS A SPECIALTY.

"More and more doctors are prescribing fresh air."

"So I notice. Guess I'll have to establish a line of motor buses," declared the druggist.—Louisville Courier-Journal.

REACHED THE USED CAR CLASS.

Now that the pay of college professors has been raised they can, perhaps, begin buying discarded last year's cars from the janitors.



Typical Gasoline Fuel Systems, Gravity Feed at Top, Vacuum Feed Below, Showing Location of Parts.

(Continued from Page 16.)

bowl, under the float, from the fuel pipe. If not, the fuel pipe is either stopped, or sediment has covered the bottom of the well over the feed pipe in the tank, if the engine is fed by gravity. The petcock under the tank should be opened and by forcing a wire up through it an opening will be made through which the gasoline may pass, bringing along with it the sediment. Disconnect the fuel pipe at the carburetor and blow through it, to force out any sediment that may be in the pipe. Connect it again to the carburetor, turn on the gasoline and see if the float chamber fills. If it does, crank the engine and note if it runs normally.

An engine that shows poor compression, when turned with the hand crank, or tested by a compression tester or gauge, usually indicates one of several defects that should be remedied before the engine can be considered in perfect condition.

Poor compression on one or more cylinders may indicate that the valves need grinding, piston rings are worn or broken, pistons or cylinders are worn or scored, or a blown out gasket if the engine is of the separable head type and a gasket is used between the cylinders and the head, spark plugs may be loose in the cylinder heads, the priming cocks

or valve plugs not tight, or the separable head loose on the engine cylinders, or damaged by loosening with a screw driver.

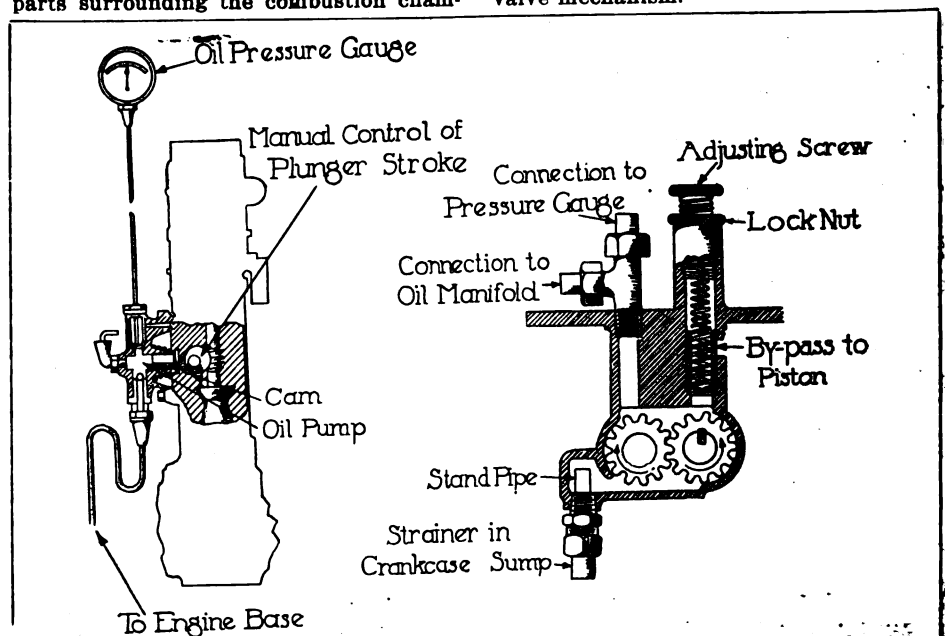
Lack of compression relates to the parts surrounding the combustion cham-

ber and defects of whatever nature will usually be found near it.

Spark plugs, valve plugs and priming cocks may be tested by squirting oil from a cup around the threads or edges. Then while the engine is turned by hand compression leaks will be shown by bubbles forcing themselves up through the oil. Tightening the various parts showing leaks will usually remedy the trouble, unless a thread is stripped or cross threaded, in which case a new part will have to be supplied.

A blown out gasket is easily discovered by the hissing sound of air forced out by the piston as it reaches the top of its compression stroke. The gasket should be replaced. The separable head, if recently removed, should be tightened a second time after the engine has become thoroughly warm, as the metal expands when warm and several additional turns can then be taken on the bolts.

Compression leaking by the valves is harder to detect, but usually manifests itself by backfiring either into the carburetor through the air intake valve or in the exhaust muffler, according to whether the inlet valve or the exhaust valve is at fault. Grinding the valves with carborundum, a coarse grade at first, and finishing with a finer grade, grinding to a seat or ring of about 1/32 inch wide around the face of the valve. This makes a perfect seat that is gas and air tight. For perfect valve action after grinding, the tappets should be adjusted, between the ends of the valve stems and the tappets. This is accomplished by loosening the lock nut on the adjustment screw either to the right or left as the case requires, till the proper adjustment is gained. This adjustment should be made when the engine is thoroughly warmed, the space between the valve stem end and the tappet should be gauged the thickness of a thin business card or a sheet of ordinary writing paper. This clearance will give the correct valve opening and also quiet the valve mechanism.

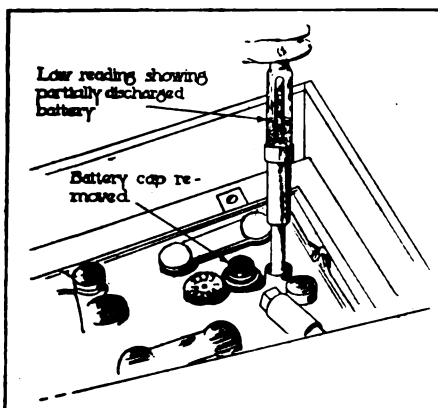


Typical Oil Pressure Pump: Left, Plunger Type, Operated by Cam from Camshaft; Right, Geared Type, Driven by Worm and Worm Gear on Camshaft.

If a vacuum tank is used in the fuel line and the strainer on the end of the fuel pipe leading into the vacuum tank has become clogged, then trouble is noted for some time before the engine stops completely, as it causes it to slow up on grades and seemingly does not deliver its full rated horsepower. The strainer should be removed and cleaned.

Lack of Oil In Engine.

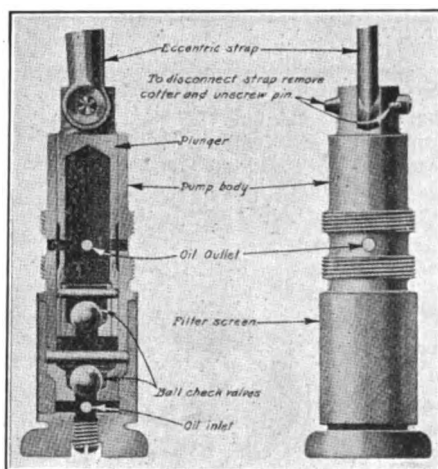
Another cause of engine stoppage, under these conditions, is lack of oil in the engine reservoir, causing the pistons to seize or stick in the cylinders. Indications of this defect will manifest themselves by the engine overheating some time before the pistons actually seize. To remedy it the oil in the base should be replenished, the spark plugs removed after the engine has cooled and a mixture of half and half kerosene and light oil poured into the combustion chambers, on top of the pistons, about a tablespoonful to each cylinder. Allow the oil a few minutes time to work down around the pistons and if the engine has a balance wheel that is not entirely enclosed, take a large monkey wrench, fit it to the rim of the balance wheel and turn the engine backwards, opposite its



Testing Storage Battery with Hydrometer.

normal direction of rotation. If the engine is of the enclosed type, having the flywheel completely shut in, the task is not as easy, and entails a great deal of extra work. By using the starting crank the engine may possibly be worked free. If not, the car may be towed, although the operator must use great care when letting in the clutch, otherwise the engine is liable to be damaged. Usually stuck pistons in a new car or a car that has had only a few thousand miles of service, can be freed easily by cranking.

A point that should be mentioned in connection with the fuel feed system is that if it is found that the main tank, feed pipe and vacuum tank are all clear and still gasoline does not flow into the carburetor bowl, a speck of dust or a piece of lint should be looked for under the float valve. This can be freed usually by removing the cap over the valve and forcing this valve slightly with a screw driver, pushing the pin into its seat, and cutting out any particle of dirt that may have become lodged at this point. When the carburetor is again flooded the piece of dirt will be washed into the bowl and may be drained out through the petcock provided for this purpose at the bottom.



Plunger Type Oil Pump, Splash System.

Once in a great while a piece of dirt may be found lodged under the needle valve, but this condition is rare. If it does it may be removed by screwing in the needle valve, crushing the particle of dirt and again unscrewing the valve to its original position.

Poor compression caused by broken or worn piston rings, or worn pistons, can usually be remedied by refitting new rings or pistons. The cylinders should, however, be examined for scores and wear and if found out of true or scored should either be reground or the scores filled by the plating process. If reground the pistons should be oversize and lapped into the cylinders when fitted, as should also the rings. Many times it is more economical to purchase necessary new parts and refit the engine with these than to attempt to repair defective fittings.

Noisy Operation of Engine.

In ordinary cases, noisy operation is due to parts that have been subject to unnecessary wear, though many times it may result from parts of the engine that are improperly adjusted. Unnecessary wear is caused usually by a lack of sufficient lubrication, or the cutting action of grit or dust which finds its way into the bearings of the car, especially those that are located on the outside of the engine. Noise in the interior parts of the engine, the pistons, gears, bearings, etc., is usually caused by undue wear or improper lubrication. The remedy is to renew the worn parts, adjust those that can be adjusted, draw off the old oil, rinse out with kerosene or gasoline and refill the reservoir with fresh, clean oil.

Carbon accumulations on the heads of

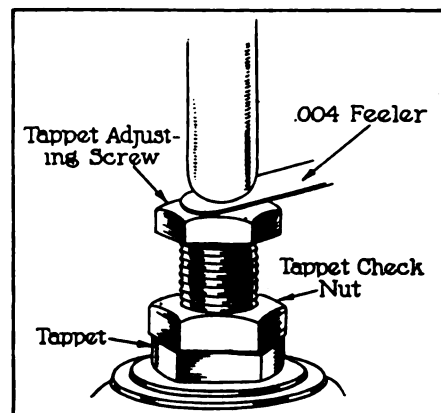


Testing Ford Engine by Holding Down Three Coil Vibrators.

the pistons and in the combustion chambers are also a source of unnecessary noise, especially if the engine overheats, as preignition is caused, resulting in a knock that is distinctly heard when the engine is under load, or brought to a stop. This trouble is remedied by removing the separable head from the cylinders and scraping the carbon from the under side of the head and the tops of the pistons. Where the separable head construction is not used it is often the better plan to burn out the carbon with an oxy-acetylene flame. This is accomplished by removing the spark plugs from the cylinders, and in some cases the valve caps also, and placing a piece of burning paper in the cylinder. The burning paper ignites the gas and in some cases the burning is hastened by the introduction of a small amount of kerosene to make the flame more intense, when the carbon is consumed in much quicker time and the metal of the cylinders and pistons will not be harmed.

Carburetor Adjustments.

When the carburetor has been properly adjusted by a repairer who makes a specialty of this work, it rarely ever becomes necessary for the motorist to

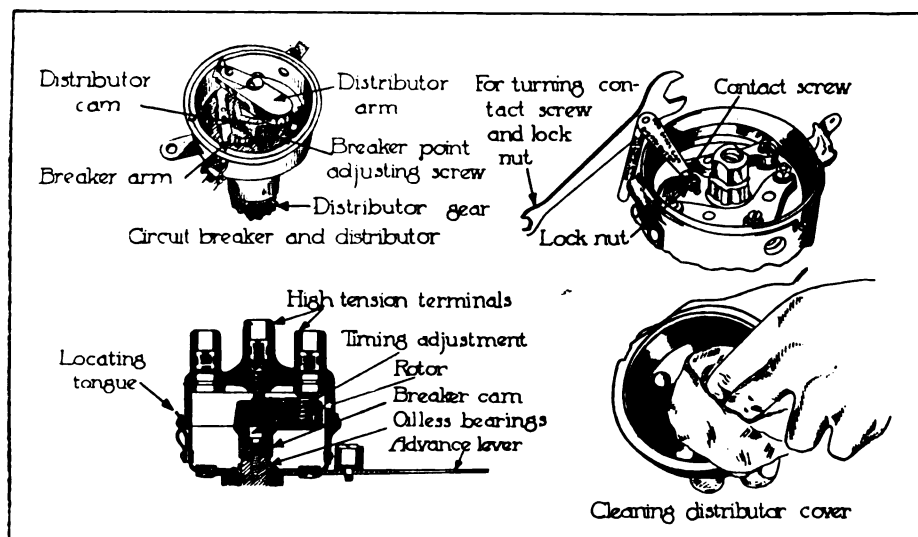


Adjusting Clearance Between Tappet and Valve Stem.

change the adjustment on the road. Carburetor parts very rarely get out of adjustment if left alone, so that if the car shows defects that are apparently in the carburetor, nine times out of 10, on investigation, the trouble will be found in the ignition system and not in the carburetor.

Black smoke issuing from the muffler denotes that the engine is getting too rich a mixture and the needle valve should then be turned down to a point where the smoke disappears and the engine hits on all cylinders. Most carburetors are equipped with a needle valve, but where there is none, recourse may be had to the method of changing the spray nozzle to a smaller size, but this had best be done by an experienced repairer.

If the engine at high speed pops back into the carburetor it is an indication that it is receiving too much air through the air valve, and the adjustment of the air valve should be turned down to a point where the popping ceases when the engine is speeded up. The needle valve should be set at a point where the engine idles perfectly, hitting all four,



Deleco Circuit Breaker and Distributor, Cleaning Case and Setting Points.

six, eight or 12 cylinders, as the case may be, at the same time allowing it to pick up freely when the throttle is opened. The spark for this adjustment should be in a retarded position on the steering wheel quadrant, so that the engine will not race unnecessarily when speeded up.

Carburetor adjustments had best be made by a repairer experienced in this class of work, and the best man obtainable is the cheapest in the long run, as speeding up an engine can do untold harm under improper conditions.

Failure of the Ignition Stroke.

It would be a rare instance in which the ignition system would cause the engine to stop operation, although it is possible. Usually warning is given of defects of this nature long before serious trouble occurs. Provided the disturbance is in the ignition system and the source of the ignition current is cut off, it will probably be found to be caused by the storage battery becoming entirely discharged, a wire grounded or a loose connection, either at the switch or battery, this applying to a car equipped with starter and lighting equipment. In case of a Ford car the cause would probably be the magneto magnets going dead, refusing to generate current, loose connections at the ignition switch or a short circuit in the wiring leading from the magneto to the coil terminal. If the ignition current is furnished by a high-tension magneto the trouble might be either that the magnets have gone dead or a short circuit in the magneto.

The car equipped with starting and lighting equipment should first be examined at the battery for defect. With a hydrometer, test each cell through the openings provided for this purpose in the top. Care should be taken not to transfer the electrolyte taken into the hydrometer from one cell to another, as this will affect the reading of the next cell. A fully discharged battery will give a reading between 1150 and 1200, and should be immediately removed from the car, and recharged from an outside source; 1250 to 1300 denotes a fully charged battery and proves that the battery is not at fault. Examine the ter-

minal connections of the battery and if found covered with a green corrosion, scrape clean with a knife, sand paper and coat lightly with kerosene or vaseline. This treatment will prevent further corrosion for a time, and insure that the battery current has an uninterrupted flow. Tighten the connections firmly, but not tight enough to twist them off.

Next examine the connections at the back of the Ignition switch, to note if they are loose. Tighten them if they are, and if not, look for a short circuited wire in the ignition primary circuit between the ammeter and the timer in the distributor case. This wire may either be found chafing on another wire or grounded to the frame of the car or engine.

If the car is a Ford the engine depends on the magneto solely for its ignition, and the engine will not run, it will be necessary to hook up a set of four dry cells in series and connect them to the battery terminal of the switch in order to have the engine operate. One side of the battery circuit, usually the negative, is grounded to the engine or car frame, while the positive side leading from the battery carbon is connected to the

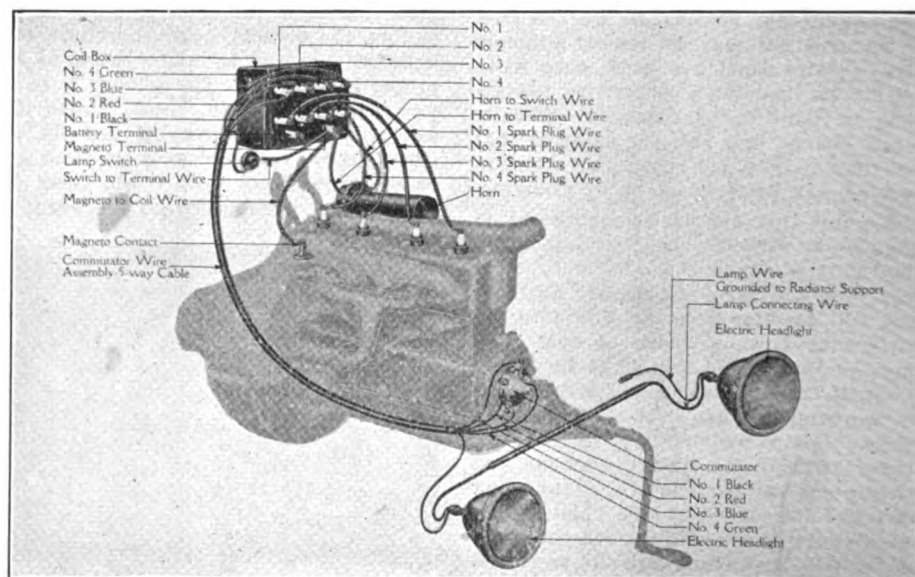
switch. Testing the engine with the battery will prove whether or not the trouble is in the magneto. If the trouble is found here the only remedy is to take the car to a competent Ford repairer and have him install a complete set of new magnets, as the Ford company does not recommend the remagnetizing of old magnets for their cars, and as the cost of new units is small, this has been proved to be the wisest course to follow.

Provided the magneto is not at fault, look for a loose connection at the switch, where the magneto wire is fastened. Sometimes this will work loose, allowing the wire to slip off and causing the engine to go dead; or possibly this wire may have become chafed and is rubbing on some metal part of the dash, in which case the current, instead of entering the switch and coils, is short-circuited back to the magneto, cutting out the engine ignition. High-tension magnetos, such as are used on some passenger cars and most all trucks, consist of small units driven from the water pump shaft, having four terminal wires that go to the plugs, and a fifth wire to a short-circuiting switch located on the dash of the vehicle. Occasionally this switch becomes accidentally closed and shuts off the ignition from the engine. It should be inspected to see that it is open. Loose connections at the back of the switch, allowing a wire to drop into the engine pan or to chafe against the engine would cause trouble.

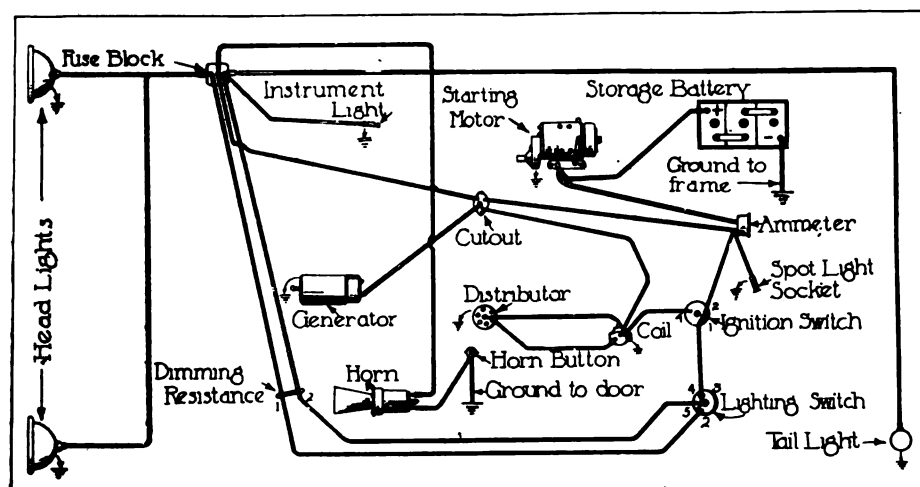
Vibrators of Ford Coil.

Defective Ford coil vibrators would hardly cause an engine to stop entirely, although they might be the source of the irregular action of the engine. A coil will occasionally go dead, but only on one cylinder at a time, and this is detected by the irregular action of the engine, skipping explosions in a cylinder. This may be occasioned by a broken wire in the coil, the vibrating points sticking, connections of the coils and box improperly set or dirty, or loose connections between the coil and the source of electrical current.

When a coil has failed, the fact



Diagram, Ford Lighting and Ignition System.



Diagram, Remy Lighting, Ignition and Starting System, Reo 1920.

whether or not it is "dead" may be proved by removing it and trying it in the place of another coil in the box. If it goes dead on that cylinder it is proof that the coil is at fault and a new one should be supplied. The vibrator points should be tested for different adjustments, before being discarded. Coils can be repaired, but the expense is so near the cost of a new one that the best policy is to make replacement.

Nearly every owner of a Ford car is familiar with the method of holding down three of the coil vibrators, when testing the engine for a skipping cylinder. For the benefit of the new owners it may be outlined as follows: First, the vibrators on the second, third and fourth coils are held down with the fingers of the two hands. The engine is kept operating with the spark advance nearly to the running position and the throttle lever open from six to seven notches. Holding down the vibrators cuts out three of the coils, allowing No. 1 cylinder to operate; second, change the fingers so that No. 2 cylinder may operate and one, three and four remain inoperative. Test the third and fourth cylinders in like manner. If there is a skipping cylinder, no explosion will be heard from it and the engine will die away. Changing the fingers quickly will allow catching the engine again before it stops. By tracing the terminal wires to the plugs from the terminals of the coil box, the tester can quickly locate the missing cylinder.

Still another method employed on cars equipped with non-vibrating coils, is to test in the same manner at the plugs, using a machinist's hammer, and one or two wood handle screw drivers.

Short-circuiting the plugs to the engine head will quickly show which cylinder is skipping. It is usually necessary to short circuit two or more plugs at a time to get the desired results.

Still another source of trouble in the Ford engine is the timer. Wear between the roller and the race in which are fixed the timing contacts, causes the case to be out of line with the roller, and the engine to skip. Too much oil or the use of a heavy grease has the same effect. Keep the timer case clean and supply light oil or vaseline and in small quantities.

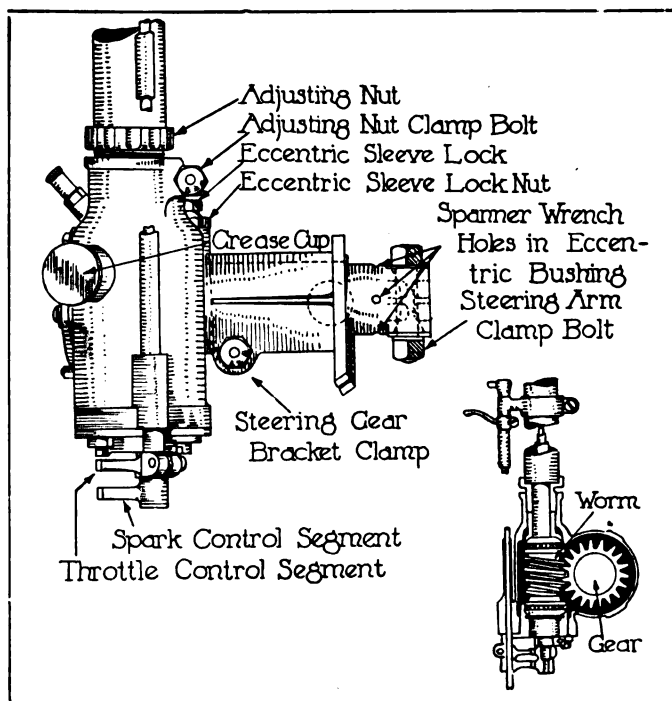
Trouble with Delco System.

A friend was talking to the writer recently about trouble he was having in a car equipped with a Delco system. The car in question was a 1916 model with six cylinders, which he had driven possibly 20,000 miles all told. He had previously been getting the finest results with his car so that the defect was not the fault of the car or the Delco system. The car would run without any trouble for a time, then apparently without any cause the engine would go "dead," and could not be started. He would let the car stand for a time and then attempt to start the engine and it would run perfectly for whatever distance he wished to travel. The next time he tried to run the car the engine would not operate, and after unsuccessfully employing all expedients suggested by several years experience with cars, he finally took the car to a garage. The repairer examined it and told him that he thought the defect was in the ignition and that by supplying a new coil his trouble would be over. He did so and had no further difficulty. It was decided a wire had probably broken or become short-circuited in the secondary coil, causing a very weak spark or none at all. The car has run perfectly ever since the new coil was installed.

Another instance, somewhat different from the above, but the cause of which seemed difficult to trace, occurred in a 1915 four-cylinder roadster. The generator failed to charge the storage battery with the result that it became necessary to have it recharged frequently from an outside source. The generator was removed from the car and sent to the nearest service station repairing that

make. It was examined by factory experts and pronounced perfect, replaced in the car, but the same unsatisfactory results were noted as before. Eventually he found a repairer who located the defect, in very short time, as he had seen the same trouble develop in other cars of the same make equipped with the same starting and lighting system. It was in the generator clutch at the forward end of the generator, where the armature receives its drive from the water pump shaft. In some manner the generator clutch key had been sheared or worn off, allowing the shaft to turn without turning the clutch and armature. Consequently the generator could not generate sufficient current to charge the storage battery, and as the battery was used for starting, lighting and ignition, it was soon exhausted. The clutch hub was replaced with a new hub and key and there was no further trouble.

Still another instance of ignition trouble that proved difficult to locate was in a ton truck, equipped with a high-tension magneto. The engine developed a skip that was at first thought to be caused by the carburetor. After setting the carburetor properly the skip still remained. The plugs were examined and were found to be free from carbon and set properly. Still the skip continued. In this particular type of truck the four insulated terminal wires leading to the spark plugs are held together midway by a metal tube about 1¼ inches in diameter and supported by a bracket fastened to the side of the engine. A crack had occurred in the rubber insulation inside this metal tube and as darkness had come on the spark could be plainly seen jumping from the break in the insulation to the metal tube. Removing the wire, taping it, and allowing it to hang free stopped the skip in the engine. The crack in the rubber insulation was probably caused by the material having lain in stock too long.



Modern Steering Gear, Showing Parts and Adjustments.

Distributor and Timer.

The distributor and timer are located in a special case and driven usually from the water pump shaft by a worm and worm gear. The timer consists of an arm actuated by a cam fastened to the drive shaft and usually driven at one-half crankshaft speed. The function of the timer is to make and break the flow of primary current supplied by the storage battery. The contact points should be kept as nearly flat and parallel to one another as possible, and should not be allowed to fit on the slant, nor should they be dressed with a coarse file. Sometimes repairers will use a fine file for this purpose, but this is poor practise as the metal is wasted. The proper course is to use a strip of No. 00 sandpaper, drawing it lightly back and forth between the points and this should be done every 1000 miles of travel.

The contact points should be so set that they will have a maximum opening of .020 to .025 inch, or the thickness of the gauge which is fastened to the side of the wrench furnished for adjusting the contact points. Adjustment of the gap between the contacts is made by loosening the lock nut with the wrench, turning the adjusting screw to the proper position and then tightening the locking nut again. The contact points should not be oiled. A slight trace of vaseline placed on the fiber block or the cam every 1000 miles will keep the cam from rusting.

Occasionally the distributor arm will slip on the driving shaft, causing the sparks to occur at the plugs too late, and the engine to run sluggishly and possibly to overheat. This may be easily cor-

rected by taking off the cover of the distributor, removing the arm and retarding the spark lever on the steering wheel to full retard position. The engine is brought to dead center position with No. 1 piston at the top of its compression stroke. Dead center is accurately indicated when the line marked "U. D. C." on the flywheel is opposite the corresponding prick punch mark or indicator on the engine frame.

In this position of the flywheel the pistons in both of the cylinders indicated by the letters U. D. C. will be at the top of the stroke. By holding the finger over the open petcock, as the engine is turned in a clockwise direction of rotation, the cylinder on compression can be determined; or the position of the piston may be found by inserting a feeler wire through the spark plug opening. This wire should have a cork stopper forced down over its upper end, so that it cannot possibly slip into the cylinder. The engine should be turned by hand, while the wire is forced up by the ascending piston till the top of its stroke is reached.

The timer contact points should be just starting to separate (the flywheel being turned in the direction of rotation past dead center position) for a six-cylinder engine, or from one inch to $\frac{3}{4}$ inch (as measured on flywheel) past dead center for a four-cylinder engine.

If it is found necessary to readjust the timing, the distributor arm, which has an arrow on it, should be removed and the nut which holds the cam in place unscrewed. The cam can be loosened by giving it a sharp rap to release it from the tapered part of the

shaft on which it fits snugly. The cam should then be turned to obtain the proper time of opening the contact points, noting that the cam strikes the fiber in the direction of rotation. The cam should be rapped down in place and the nut tightened to keep it from slipping.

Timers for Eight and 12-Cylinder Engines.

The timer of the Delco equipment, as used on the Cadillac Eight and the Packard Twin Six, is typical of many designs of eight and 12-cylinder engines. On the Cadillac timer the cam has eight lobes and operates two contact breakers at one-half crankshaft speed. These breakers are connected in parallel, and are adjusted to open and close at the same time. The object is to distribute over two sets of breakers the current which would otherwise pass through one. This greatly reduces the wear and burning of the points. In order to accomplish this, both sets of contact points should be adjusted exactly the same, namely, to open .020 inch.

On the Packard unit there are two low-tension circuits and two distributors. A separate breaker, coil, condenser and distributor serve each set of six cylinders. The breaker mechanism consists of a separate set of circuit breaker points for each low-tension circuit. These are operated by a single three-lobed cam mounted on the top of a vertical shaft which is driven at crankshaft speed. This causes each low-tension circuit to be broken three times during each revolution of the crankshaft, thus providing the six necessary sparks for each revolution of the crankshaft.

SUMMARY OF DEFECTS AND REMEDIES

COOLING SYSTEM.		
Condition.	Cause.	Restoration.
Overheating.	Water jacket, radiator or pipe clogged.	Fill with solution of half pound of sal soda to five gallons of hot water; run engine half hour, flush with fresh water several times.
Overheating, water dissipated.	Water pipe loose, broken pin in water pump impeller.	Replace gasket, tighten bolts, replace pin or renew impeller.
Overheating.	Poor grade of oil, causing friction between pistons and cylinder walls.	Supply correct grade of oil.
Overheating.	Fan belt loose or broken.	Adjust or replace belt.
Overheating.	Oil in reservoir low, poor grade of oil, sediment in oil reservoir.	Replenish oil supply, supply correct grade of oil, clean and flush reservoir.
Overheating, squeaking, grinding noise.	Carbon in ring grooves; insufficient opening at ends of ring; blading on cylinder walls; defective oiling.	Remove carbon deposits; file ends of ring; lap ring to walls; supply sufficient oil.
Overheating, grinding or dull squeak, dull humming.	Piston binds in cylinder; walls scored; worn out of round; side slap.	Lap off excess metal; replace with new parts.
Overheating, due to friction.	Crankshaft main bearings adjusted too tight; babbitt burned out of boxes; faulty lubrication.	Adjust; renew babbitt; clean out oil ducts and tubes; supply right grade of oil.
Overheating, due to friction.	Crankshaft scored or rough at bearings; sprung.	Smooth off scores and roughness; straighten shaft.
LOSS OF POWER.		
Condition.	Cause.	Restoration.
Loss of power, hissing sound.	Priming cups leak at bore or gaskets, priming cups leak at bore or fittings.	Seat tighter, replace gaskets or renew plugs, seat tighter, grind fittings to new seat.
Preignition, loss of compression.	Combustion chamber cracked, blow hole in casting, carbon, rough or sharp edges.	Weld casting, clean carbon, remove rough or sharp edges.
Loss of power, knocks.	Piston head cracked, carbon deposits.	Weld casting, remove carbon.
Loss of power, hissing.	Leak around valve cap, leak at gasket.	Remove and reft with pipe compound, replace gasket.
Loss of power, clicking.	Valve head warped, scored or pitted; covered with carbon or scale; loose on stem (two-piece valve).	True valve or replace it, regrind seat, remove scale, re-rivet head.
Loss of power, valve not closing, rattle or clicking.	Valve stem covered with carbon, stem bent, binds in guide, stuck in guide, loose in guide.	Scrape or polish clean, tighten, free with kerosene, replace guide.
Loss of power.	Valve seat warped or pitted, coated with carbon that prevents seating.	Reseat valve, clean and grind to seat.
Loss of power.	Wristpin loose, scores cylinder.	Tighten securely, replace cylinder if score is deep or refill by plating process.

Condition.	Cause.	Restoration.
Loss of power.	Cylinder wall scored, gas leaks past piston rings.	Rebore cylinder or fill scores by plating process.
Loss of compression, gas blows by piston rings, hissing sound.	Loss of spring tension, loose in grooves, scored, worn or broken, slots in line.	Replace orpeen ring, fit new rings, lap smooth, replace rings, turn rings to stagger slots.
NOISY OPERATION.		
Sharp metallic knock.	Cylinder base retaining bolts loose, piston strikes at upper end.	Tighten bolts, smooth edges at top of piston.
Dull metallic knock.	Wristpin loose in piston.	Replace with new pin and fasten securely.
Intermittent metallic knock, squeaking.	Connecting rod bearings loose, excessive end play, adjusted too tight.	Adjust bearing caps, put in longer bushings, insert shims to allow more clearance.
Distinct knock.	Connecting rod worn in upper bushing, wear at crank pin, side play in piston.	Adjust or place with new part, scrape to fit, use longer wristpin bearings.
Metallic knock, squeaking.	Main bearings loose, defective lubrication.	Refit bearings closer to shaft, clean oilways.
Sharp knock.	Connecting rod and main bearing bolts loose.	Tighten bolts.
Knocking.	Lower half crank case bolts loose.	Tighten bolts.
Very sharp knock.	Flywheel loose on key of crankshaft, retention bolts loose.	Refit key and keyway, tighten bolts.
Sharp pound.	Engine base loose on frame.	Tighten bolts.
Knocking.	Overheating, water jacket clogged with sediment, walls covered with scale.	Dissolve scale and flush out with water under pressure.
Knocking.	Overheating, water pipe leaks, loss of water, clogged with sediment.	Fill with water, clean sediment with hot water and sal-soda, one-half pound to five gallons of water, flush with clean water and refill.
Grinding sound.	Cylinder and piston dry of oil, poor lubricant.	Replenish oil and repair oil system, supply right grade of oil.
Grinding or squeak in all bearings.	Oil reservoir too low, poor lubricant.	Refill with right grade of cylinder oil.
Squeaking sound.	Crankshaft oiling system defective.	Clean oil ducts and tubes, supply fresh lubricant.
Clicking sound.	Valve push rod retention stirrup loose.	Tighten retention nuts.
Clicking sound or rattle.	Fan blade loose, striking radiator.	Re-rivet, bend blades clear of radiator.
Clicking or grinding sound.	Fan hub bearing ball broken.	Replace with new ball.
Sharp whistling sound.	Intake manifold joints leaking.	Supply new gaskets.
Sharp hissing sound.	Exhaust manifold joints leaking.	Tighten nuts or supply new gaskets.
Blowing sound.	Crankcase packing leaking.	Supply new packing and tighten bolts.
Valve sticks, irregular action, rattle or clicking.	Valve stem guide burned or rough, loose in valve chamber, worn or loose.	Ream bore of guide, tighten guide.
Valve lift short, rattle or clinking noise.	Valve tappet loose in guide, too great clearance between valve stem and tappet.	Replace valve, adjust clearance.
Poor valve action, clicking sound, blow-back in carburetor.	Valve lift cam worn, loose on shaft, out of time.	Replace cam and shaft, retime correctly.
Irregular valve action, metallic knock or rattle, grinding or humming sound.	Camshaft driven gear loose, out of time, worn or broken, teeth meshed too deep, fiber gears swelling.	Tighten securely, time correctly, replace with new gears, adjust correctly, replace with new steel gears.
Valves do not open properly, slight knock.	Camshaft bushings worn or loose.	Replace with new bushings.
Engine heats.	Low oil in reservoir.	Refill reservoir.
Heavy oil consumption.	Grade of oil poor.	Drain out, supply good oil.
Oil level petcock plugged or stuck.	Oil pipe clogged.	Clean out pipe.
Pointer of oil level bent.	Too light oil.	Use heavier oil.
Filter screen mesh filled with lint and sediment.	Crankcase joints leaking.	Supply new gasket.
No pressure at gauge.	Pump or tubing leaking.	Remove and repair.
Blue smoke at exhaust.	Fails to indicate height in reservoir.	Run wire through and free petcock.
Carbon accumulates quickly in engine.	Oil indication for the reservoir not correct.	Straighten.
Irregular oil feed.	Oil cannot pass.	Remove screen and clean with gasoline.
Bearings overheat after several miles of use.	Pump air bound.	Disconnect feed pipe and prime pump with oil.
Oil feed not working, pump working.	Feed pipe clogged.	Blow out with tire pump.
Ball check valves stuck (plunger pump only).	Oil supply in reservoir exhausted.	Refill reservoir.
Defective pump drive.	Screen clogged.	Remove and clean.
Pump plunger and cylinder worn (plunger type only).	Oil level too high.	Drain to proper level.
Sight feed gauge leaks.	Oil passing by piston and rings.	Replace with new rings.
Sight feed glass fills full.	Poor oil.	Drain and refill with good oil.
Metal float punctured.	Oil level too high in base.	Drain to proper level.
Oil indicator loose on rod.	Fouled filter screen.	Remove and clean.
Engine heats quickly and cranks hard.	Regulator not working properly.	Clean and adjust.
Engine runs at its best when hot, cranks hard.	Oil tubes clogged.	Remove and clean.
Engine loses power when hot.	Oil too light.	Drain and refill with heavier grade.
Engine noisy, scraping sound.	Oil screen plugged.	Remove and clean.
Engine noisy (squeaks).	Oil pipe bent or plugged.	Remove and straighten or blow out with tire pump.
Engine sticks.	Lint in the sight feed.	Clean out.
	Oil will not flow.	Remove pump and clean check valves; note that valves seat properly.
	Oil will not circulate.	Examine drive.
	Irregular oil feed.	Replace cylinder and plunger with new parts.
	Oil overflows at gauge.	Remove cover and supply new gasket.
	Oil not flowing away.	Force air through discharge pipe.
	Reading incorrect, shows reservoir empty continuously.	Remove, empty oil and solder.
	Incorrect reading.	Remove and tighten.
	Bearings too tight.	Readjust bearings.
	Lack of oil.	Refill with oil.
	Oil too heavy.	Refill with lighter oil.
	Oil too light.	Refill with heavier oil.
	Piston or cylinder dry.	Low oil in reservoir; refill.
	Bearings dry or too tight.	Stop engine, loosen bearings and clean oilways.
	Pistons stuck in cylinders.	Remove spark plug, put ¼ pint oil and kerosene in each cylinder. Turn flywheel backwards, then ahead by starting crank.
	Lack of oil.	Refill reservoir.

Condition.	Cause.	Restoration.
Clutch.		
Clutch slips (cone).	Too much oil on facing.	Hold out with foot, wash off with gasoline, apply fuller's earth or powdered borax.
Clutch grabs (cone).	Lack of oil on face.	Hold out clutch and apply neatsfoot oil to leather facing; work clutch back and forth several times.
Noisy clutch.	Lack of grease in cup.	Refill cup and sorew down once or twice.
Pedal chatters under the foot.	Worn clutch collar, lack of oil.	Remove and replace with new; adjust and oil frequently.
Transmission.		
Gears noisy.	Lack of lubrication.	Drain old lubricant and refill.
Lubricant works out at ends of drive shaft.	Worn parts.	Renew.
Lubricant works out around cover.	Poor felt washers.	Remove and supply new washer
	Adjustment not tight.	Tighten adjustments.
	Poor gasket.	Renew gasket.
	Cover not tight.	Tighten cover screws or nuts.
CARBURETOR DEFECTS.		
Engine fails to start.	Insufficient fuel; gasoline does not run into the carburetor bowl.	Replenish gasoline in main tank; open petcock on fuel line; open petcock under main tank, draw off sediment; prime carburetor till it overflows; remove screen and clean (vacuum tank); adjust carburetor (last resort). Open vent in main tank cover (vacuum tank).
Engine fails to start.	Poor gasoline containing water or very low specific gravity.	Draw off and refill with good grade of gasoline.
Engine fails to start.	Cylinders flooded.	Open relief cocks, retard throttle, crank engine by hand until excess is eliminated and explosion occurs; close cocks, open throttle and start engine.
Engine fails to start.	Vacuum tank empty.	Fill vacuum tank through filler plug and start engine, after priming carburetor.
Engine starts but misses.	Cold weather.	Close choker and wait for engine to warm up.
Engine starts but misses; popping sound.	Lean mixture.	Adjust needle valve for slightly larger opening, if spray nozzle; adjust air slightly tighter.
Engine starts; will not pull.	Too rich mixture.	Close needle valve till engine idles perfectly; adjust air valve for higher speed.
	Too lean mixture.	Open needle valve till engine idles perfectly. Adjust air valve for high speed.
Engine runs regularly for a few minutes, then stops.	Cold weather; obstruction in feed pipe; insufficient gasoline.	Close choker till engine warms up; remove obstruction; replenish gasoline.
Engine stops suddenly.	Lack of gasoline; stoppage of fuel pipe.	Prime carburetor; refill tank; clean out fuel pipe.
Engine stops slowly.	Needle valve has become loose, obstruction under valve.	Readjust and tighten; screw needle in against seat; turn back until engine idles properly.
Engine lopes or loads up.	Air leaks between carburetor and engine.	Tighten bolts of flange connections, or supply new gaskets and tighten.
Lack of flexibility.	Too rich mixture.	Readjust needle valve of carburetor.
Engine misses explosions, pops back in carburetor.	Air intake valve too weak.	Readjust air valve and needle valve.
	Mixture too lean; dirt under needle valve; too much air enters intake manifold.	Adjust needle valve for more gasoline; screw down valve against seat, to cut particle of dirt, readjust; tighten connections between carburetor and engine, replace frayed gaskets.
	Dirt in gasoline tank.	Open petcock, drain out and refill with fresh gasoline.
Engine misses on high speed.	Insufficient gas; too much gas.	Adjust for high speed.
Engine misses on low speed.	Insufficient gas; too much gas; too high float level.	Adjust for low speed; adjust float.
Engine overheats.	Too rich a mixture; spark in retarded position.	Adjust; carry spark as high as possible without having engine labor.
FAILURE OF THE IGNITION SYSTEM. TIMER AND DISTRIBUTOR.		
Irregular operation.	Worn or pitted contact segments; pitted platinum points; metal dust or dirty oil; worn bearings.	Smooth down by grinding; smooth with oil stone or very fine file; clean thoroughly; renew bearing.
Irregular operation.	Terminals loose; contact brush slipping.	Tighten; tighten brush.
Ignition late.	Timing gears set improperly.	Reset timing gears.
Ignition early.	Timing gears set improperly.	Reset timing gears.
No ignition.	Burnt out resistance unit, battery discharged, magneto dead, broken wire.	Replace with new unit; recharge battery; replace magneto; repair wire.
COIL.		
Irregular operation.	Loose terminals; switch contact poor; vibrators improperly adjusted.	Tighten; readjust vibrators.
No ignition.	Defective condenser; defective wiring; connections broken; internal wiring broken; coil unit dead.	Return to factory; renew wiring; renew connections; repair; return to factory.
WIRING.		
Irregular operation.	Loose terminals; chafed insulation or short circuit.	Tighten; renew or insulate wire.
No ignition (one cylinder).	Broken plug terminal.	Renew.
Coil fails to operate.	Timer wire broken.	Try another coil or renew.
No ignition.	Broken battery or ground wire.	Replace and tighten.
SPARK PLUGS.		
Plug misfires.	Porcelain oil soaked or wet; loose; electrode loose in shell; loose in porcelain; terminal loose.	Clean plug; tighten bushing; tighten or renew; tighten.
Plug inoperative.	Porcelain cracked.	Renew.
Plug short circuited.	Carbon accumulations.	Remove and clean.
Compression leaks.	Plug loose in cylinder; gasket broken.	Tighten; renew gasket.
Plug short circuited.	Points set too close, cracked porcelain.	Adjust to 1/32 inch, renew porcelain.
Plug inoperative.	Points set too far apart.	Adjust to 1/32 inch.

The Proper Alignment of Automobile Wheels

SUPPOSE that with every step you took you turned and twisted your feet like a vaudeville dancer imitating the noise of a railroad train. How long do you think your shoes would last? There are no available figures concern-

avoid trouble. It will reduce the tire bill. **Aligning Wheels with a Cord.**

One method that is used in service stations to test the alignment of wheels is by the use of a cord. A bolt or piece of iron is fastened at one end of the cord

the rod end will have to be loosened and the rod either lengthened or shortened, as the wheels are out or in. Placing car on a level floor will soon enable the motorist, after practising a few times with the cord, to test the alignment of the front wheels of his car with a certain degree of accuracy that will satisfy him he should do this work periodically.

Aligning with Pointers.

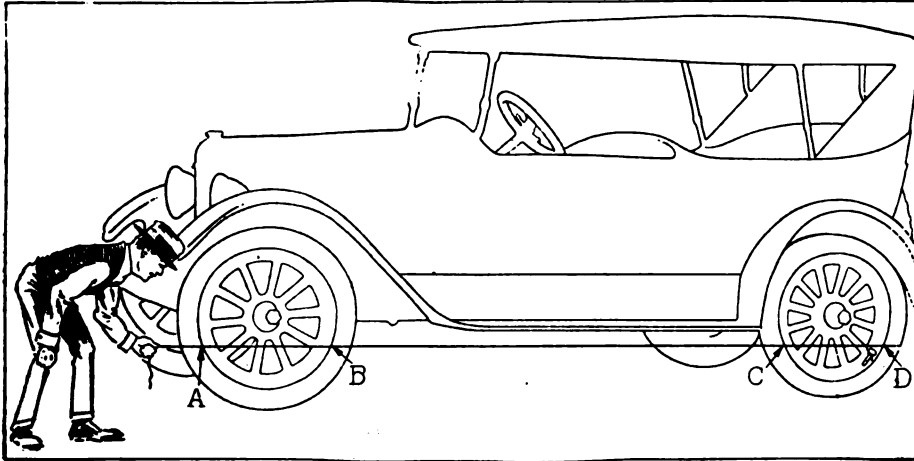
When aligning the front wheels with pointers as shown in the illustration, jack up the front of the car from the center of the axle so that the distance rod is not interfered with. With both wheels free to revolve a center line may be marked on each tire by holding a soft lead pencil against it when spinning. The pencil must be held steady or the result will not be a straight line.

Next measure with a stick or tape the distance between these lines at a point opposite the hub. Turn the wheels half a revolution and measure again. The distance between the two results is the average allowing for a slight wobble, and should be $\frac{5}{16}$ inch to $\frac{3}{8}$ inch less than distance measured in same way at rear.

The measuring stick shown in the illustration is probably the handiest way to measure this distance and can be made by any one handy with tools in a few minutes time. To adjust the distance rod it is necessary to remove one of the bolts so that the clamp screw can be loosened and the clevis adjusted by turning on the threads of the distance rod. Any back lash in the axle knuckles and clevises should be taken up by straining the wheels outward in front before setting the distance rod. The job should always be checked after the wheels have been let down on the ground.

Aligning with a Rod.

The rod aligning gauge consists of a $\frac{1}{4}$ -inch rod of iron, over which is slid a length of pipe, the two members being held by a set screw. The toe-in varies from $\frac{5}{16}$ to $\frac{3}{8}$ inch and should be measured on a line with the hub. A similar



Method of Aligning Motor Car Wheels by the Simple Use of Cord.

ing the average life of a pair of vaudeville shoes, but it is a good guess that a dancer's shoe bill looms large at the end of the year.

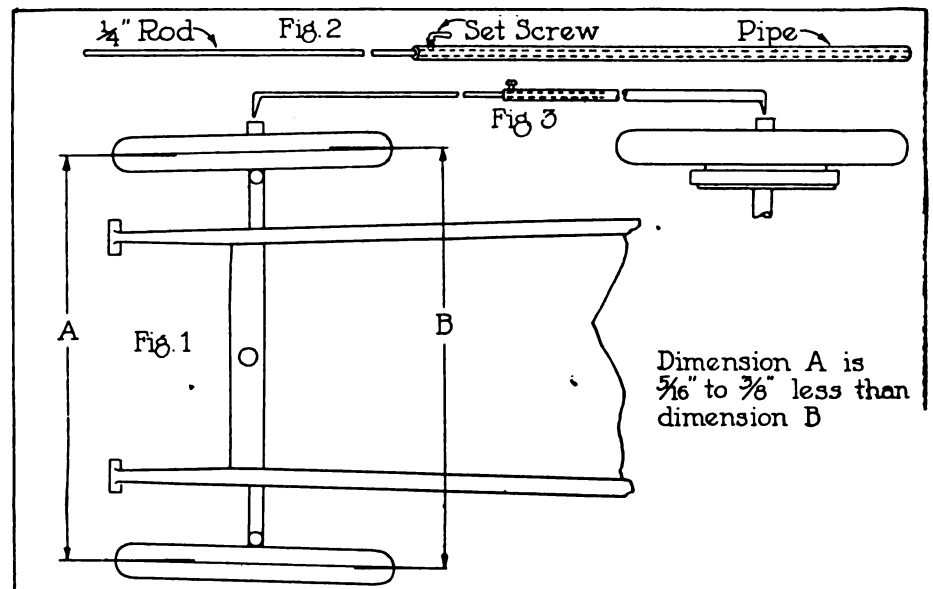
The wear on the tread of an automobile tire on a wobbly wheel is much greater in proportion than that on the soles of a dancer's shoes. A tire is built to roll forward in a straight line, not sidewise with a twisting motion. A tire on a wheel that is out of alignment cannot possibly give good service. Frequently the mileage is cut down fully one-half because the tread is ground away long before the casing has delivered its full quota of miles, and the extent of this loss, of course, depends directly on the degree of misalignment.

Watch the cars that pass your door or that you meet when you are driving. The number of wheels out of alignment will surprise you. As the driver is unable to see the tire as it revolves, he is perfectly unconscious of the condition and his first suspicion that things are not right comes when he notices that his tire tread is wearing abnormally fast. Even then the cause of the trouble is hidden, and in the absence of a tangible reason he concludes that the tire was defective.

There are many minor accidents that force the wheels out of line. The car may be carelessly driven diagonally against the curb, or one wheel drop into a large rut with the opposite wheel unaffected. An axle, steering rod or knuckle may be bent, or the demountable rim may not have been applied. Any of these conditions will produce abnormal tread wear, for they cause the tire to undergo a diagonal grind, and this wears off the tread just as surely as if it were applied to an emery wheel. It is wise to check up these points as soon as premature wear begins to show. The cause usually may be found after a few minutes search. It is a still better plan to have the wheels tested for alignment periodically and

"D," and the cord with the bolt is passed around the tire and felloe of the wheel so that the cord when drawn tight will be below the wheel hub. The cord is carried forward to the front wheel and held in position "A" against the front edge of the front tire, as shown in the illustration. The steering wheel is turned so that the cord will touch the sides of the tire of the front wheel at "A" and "B" equally when the cord is drawn tight.

Change the cord to the opposite side of the car and repeat the operation, fastening the cord around the rear wheel as before. Drawing the cord tightly across both rear and front wheels below the hubs will show how much the front wheel is out of alignment. If the alignment is correct the cord should touch both edges of the tire lightly. If out of alignment, the cord will either bear hard on rear edge of the front tire, or will not touch it at all. In either case the



Method of Truing Up Wheels by Use of Rod Inserted in a Piece of Piping.

device for determining the parallelism of the axles, front and rear, is shown. The device consists of an iron rod fitting a piece of pipe and held by a set screw. The ends of the pipe and rod are pointed to make centering of the device easy.

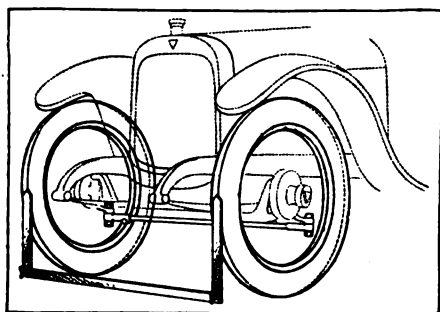
Manufactured Wheel Aligner.

Probably the manufactured wheel aligner shown in the illustration and made by J. F. Duby, Mattapan, Mass., will be of interest to many motorists who desire a device that is much more accurate than the majority of home-made devices.

The Duby gauge is mounted on roller casters and is made entirely of metal. The side members are shaped similar to a try square, the shorter end of the square fitting across the front of the tire, while the longer side of the square fits parallel with the side of the tire. The squares are adjustable by means of the two handles at the center, which slide the squares either in or out till the proper adjustment is reached. The degree of alignment is shown by pointers on dials above the roller casters. When the wheels are properly aligned the correct alignment is shown on these dials.

Try Square for Aligning Wheels.

A large try square is a simple tool for



Aligning Front Wheels with Pointers.

aligning front and rear wheels. A piece of iron approximately $\frac{1}{4}$ inch wide by an inch thick by 16 feet long and another $5\frac{1}{2}$ feet long are welded at right angles. With this device it is possible to align the rear and front wheels; also the two front wheels and the two rear wheels.

WHY LIGHTS DO NOT BURN.

If a single lamp does not burn it may be due to a burned out bulb or one making a poor contact in the socket, or to a loose connection at the lamp. Failure of all the lights may be caused by a run-down battery or a leaky cell, which allows the electrolyte to leak away, thus opening the battery circuit. Running the generator, if it is disconnected from the battery, will burn out the lights unless the generator field fuse is removed. If the contact fingers in the lighting switch do not make proper contact the lamps will not burn.

EXCESSIVE SMOKING AT THE MUFFLER.

The cause of excessive smoking and rapid carbonization of an engine having good compression is the use of too much oil in the crankcase or of an incorrect grade of oil, usually of too light a body.

POWER REQUIRED TO DRIVE MAGNETO.

Many motorists labor under the impression that a magneto absorbs from a half to one horsepower to drive it. Nothing could be further from the truth, and it is certain that if a magneto required anything like a half horsepower to drive it no maker would fit it on a car, as it would be far too wasteful of energy. A consideration of the question will prove that a magneto requires a certain small amount put into it, part of which is converted into electrical energy and produces the spark, the remainder overcoming the friction of the bearings and the inertia of the make and break. A very simple proof that the power required to drive the magneto at full output is very small is found in the fact that it can be rotated quite easily and continuously by hand with suitable gearing.

It is quite a simple matter, given the proper appliances to test the exact horsepower taken by a magneto at any speed. The method adopted is as follows:

An electric motor, provided with an accurate voltmeter and an ammeter, both being finely graduated, is used to drive the magneto. It is known exactly what the "no-load" input of the motor is, and it is then coupled up to the magneto. Then all that has to be done is to take readings of the voltmeter and ammeter at various speeds; these readings give the watts put into the meter and as 746 watts equal one horsepower, the energy consumed by the magneto can be obtained at once. This reading can be taken to quite small limits, so that there need be no questions as to the accuracy of the test. It is reported that in no instance has it been found that more than $1\frac{1}{2}$ horsepower has been absorbed when running at a much higher speed than obtains in practice, and at normal speeds the readings have been only found equivalent to $1\frac{1}{5}$ horsepower. It is, therefore, seen that the power actually absorbed is a negligible quantity and need never come into serious consideration in any question as to the amount of energy withdrawn from useful service.

SUN GLARE GLASSES.

Many a sick headache has been caused by the glare of sun on glistening white snow or sand.

Amber-tint glasses are frequently worn either alone, or over regular glasses, to protect the eyes from sun glare.

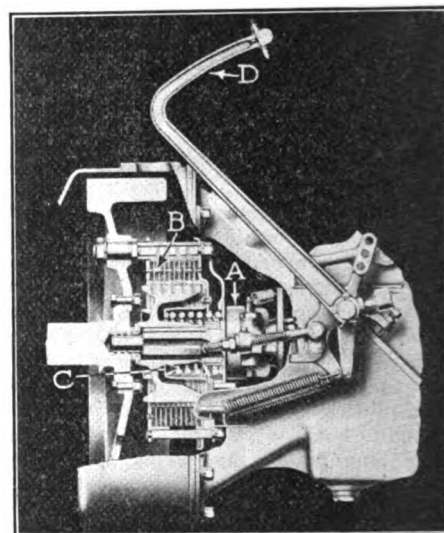
A much cheaper, but withal practical and serviceable protector against sun glare on snow, or sand either for that matter, is made of transparent amber tint sheeting—the same material that is used for automobile window lights. The right quality of this material is practically as clear as glass. It is fitted into "shell" or metal frames the same as glass.

Of course it cannot be made to magnify, nor correct short or long sight or astigmatism, and is valuable only as a glare protector. For that purpose it is equally as effective as colored glass.

Avoid Excessive Use of Clutch

Are you a clutch rider? Does your foot continually rest upon the pedal controlling this important part of your car? If so, you are unconsciously wasting power and are helping put the clutch into a condition where it will slip permanently. Spend a few minutes time studying your clutch, its make up and the principle on which it works; learn to keep your foot off the pedal when it is not required and you need never have any trouble from this device.

The man who keeps his foot continuously on the clutch pedal exerts some pressure—however slight, though but the weight of the foot—which has a tendency to release the spring tension and make the clutch slip. Slipping causes waste of power and friction, which wears away the contact surfaces, increasing all the while the slipping propensity. The driver



Excessive Riding of the Clutch Pedal "D" Causes Wear of the Clutch Throw-Out Collar "A" and Friction Surfaces of the Discs "B." Clutch Spring Shown at "C."

should not act all the time as though fearing to release the clutch. With practice the foot should go automatically into place on necessity.

Though the clutch spring in most types of disc clutches may be heavy enough to prevent serious damage by slipping, there is another point just as important to consider, which is that any pressure on the clutch pedal is transmitted directly to the clutch throw-out bearing and will surely result in damage to this bearing if clutch riding is practised.

OIL SHIELD.

When vaporized oil that comes through the breather is blown out in a mist covering the interior of the hood and engine, the trouble may be cured by fitting an elbow of soft rubber hose over the breather pipe. A tin pipe is fitted over the end of this elbow long enough to reach down into the dust pan, into which it is fastened. In this manner the vapor will be carried away from the engine and hood.

Hints on Soldering for Motorist and Repair Man

A KNOWLEDGE of soldering is more needed today than ever before, for all telephone and electric light connections should be soldered, and it is absolutely necessary that all ignition joints on the tractor and automobile be treated in a like manner, to say nothing of the various small articles in need of mending or patching.

Purchase one or two heavy soldering irons—light ones will not do as they will not hold the heat—and fit them with wooden handles such as are used for large files. A stick of solder will also be needed. Purchase from the hardware dealer what is known as half and half—half lead and half tin. A few pieces of rosin, a bottle of muriatic acid and some sal ammoniac will complete the outfit, except for a few strips of zinc which can be purchased from some plumber.

Regarding the soldering of copper or iron as it is called, there are two requirements that must be borne in mind: The point of the copper must always be tinned and kept tinned and the iron must be hot, but not quite red hot. To tin the iron, heat it, clamp the shank in a vise and dress up the point with a smooth file to a perfectly bright surface; then remove from the vise and rub the point on a piece of tin with solder and sal ammoniac. The sal ammoniac makes the solder adhere to the point of the iron.

Prepare a soldering fluid in this manner: Take one pint of common muriatic acid, place in an earthen bowl or glass jar and add scraps of zinc, a little at a time, until no more can be dissolved. The addition of the zinc causes the acid to heat and boil, and if added too rapidly the bowl may crack. The gas given off is explosive and should be kept away from the flame.

Improving Soldering Mixture.

The mixture which you now have is that generally used in soldering, but may be improved as follows: Dissolve one ounce of sal ammoniac in three fluid ounces of water. Allow the muriatic zinc solution to stand until clear and then pour off the liquid and throw away the residue. To clear the solution add the other two mixtures and then to the whole add a few drops of muriatic acid. In general use rosin as a flux when soldering articles of brass or copper and the acid solution for all other articles.

Before attempting to unite the parts, clean thoroughly by scraping with an old knife or by rubbing with sand paper. It is absolutely essential that they be bright and clean and free from grease.

Apply the acid to both parts with a brush or the rosin by melting with the hot iron, and then proceed to tin the parts as follows: Dip the point of the hot iron into the soldering compound and then pick up on it a small particle of solder and apply with a slow stroking motion to the parts until they have been given a thin, bright coating of tin. If the parts are too large they must be heated first.

After tinning the parts should be

placed in close contact and united by applying the hot iron with a small additional amount of solder or holding in the flame of a blow torch such as painters use. Use as little solder as possible and leave the work smooth. Piling on solder does not strengthen the joint; it only shows lack of experience in doing the job.

The finer grades of tin foil may be used in place of solder in case of emergency, as they contain approximately the correct proportions of tin and lead.

Substitute for Soldering Fluid.

As a substitute for the customary soldering fluid and soldering mediums an ammonia soap is recommended, which is made by the mixture of finely powdered rosin in a strong ammonia solution. When this soap is used only the finely divided rosin remains on the soldered place after the operation. This soldering process is well adapted for joining the copper wires of electrical conduits, since the rosin at the same time serves as an insulator.

Soldering fat for iron is composed of 50 parts olive oil and 50 parts powdered sal ammoniac. Soldering fat for aluminum is made by melting together equal parts of rosin and tallow, half the quantity of zinc chloride being added to the mixture.

Soldering paste consists of neutral soldering liquid thickened with starch paste. This paste must be applied more lightly than the soldering liquid.

Soldering salt is prepared by mixing equal parts of neutral zinc chloride, free from iron, and powdered sal ammoniac. When required for use one part of the salt should be dissolved in three or four parts of water.

Successful Soldering of Steel.

When steel is to be soldered on steel, or iron on steel, it is necessary to remove every trace of oxide of iron between the surfaces in contact. Melt, in an earthen vessel, the following: Borax, three parts; colophony, two parts; pulverized glass, three parts; steel filings, two parts; carbonate of potash, one part; hard soap, powdered, one part. Flow the melted mass on to a cold plate of sheet iron and after cooling break up the pieces and pulverize. This powder is then thrown on the surfaces a few minutes before the pieces to be soldered are brought together. The borax and glass contained in the composition dissolve, and consequently liquify all of the impurities, which if they were allowed to remain between the pieces soldered might form scales, which might prove dangerous, or interfere with the resistance of the parts.

Making Soldering Acid.

Many service stations, where a large amount of soldering is done, find their bills at the end of the year for soldering acid alone mount up to quite an item. As soldering acid is easy and safe to make if a few precautions are observed, this expense can be greatly reduced by the pur-

chase of the necessary materials and mixing them as wanted, making a finished acid which is fully up to the standard of that purchased.

The following recipe will be found to give a satisfactory acid for the all-around soldering of tin, brass, copper and other similar metals. To make one gallon of this soldering fluid, take three quarts of common muriatic acid and dissolve in it as much zinc as it will take up. The acid, as is well known, must be placed in an earthenware or glass vessel. The zinc may be sheet clippings or common plate spelter broken into small pieces. Place the acid in the vessel and add the zinc in small portions at a time so it will not boil over. When the action of the acid on the metal has stopped it indicates that the solution is saturated. Care must be taken, however to see that there is a small amount of zinc left in the bottom, as otherwise the acid will be in excess. The idea is to have the acid continually take up as much zinc as it can.

How to Remove Precipitate.

There will remain some residue in the form of a black precipitate, which is the lead which all zinc contains in some quantity, and which is not dissolved by the muriatic acid. This precipitate may be removed by filtering through a funnel in the bottom of which has been placed a little absorbent cotton, or the solution may be allowed to stand over night, when the lead will settle and the clear solution on top can be poured off. While the lead precipitate is not particularly injurious to the soldering fluid, it is better to have a good, clear solution.

The next step is to dissolve six ounces of sal ammoniac in a pint of warm water. In another pint dissolve four ounces of chloride of tin. This will usually be cloudy, but will not be injurious. Now mix the three solutions together. The resulting mixture will be slightly cloudy at first, but the addition of a few drops of muriatic acid will render it perfectly clear. Do not add any more acid than is necessary to clarify the mixture, as too much would be injurious.

This soldering acid will not spatter when the iron is applied to it. It has also been found that a poorer grade of solder may be used with it than with the usual commercial product.

DIP BRASS CASTINGS IN ACID SOLUTION.

Brass castings may be cleaned in an instant by dipping them into a solution of three parts of sulphuric acid and three parts nitric acid to which, after they have been mixed, there has been added one quart of common salt, the whole being stirred until the salt has been dissolved. If this mixture is placed in an earthenware vessel the brass castings can be dipped in it, removed immediately and rinsed in clean water. The castings will be made as bright as new by this method and little labor is involved.

New Plants of Timken-Detroit Axle Co.

TIMKEN-DETROIT Axle Co., Detroit, is making plans for expansion on a larger scale this year to provide for an increase of at least 50 per cent. in its output in 1921, and to insure this it has been decided that the company will produce in its own factories still more of the important materials which enter into its product, and thus also reduce costs and promote efficiency. It has been the fixed policy of the Timken company to have at least two sources of supply for all of its important requirements, in most cases one of these being its own factories, the exceptions being raw materials and Timken roller bearings. The Timken Roller Bearing Co. is now operating two separate and distinct factories to provide insurance against accident at either one of the factories.

The Timken-Detroit Axle Co. operates its own malleable foundry, steel foundry, forge plant and gear plants, both bevel and worm. This company was organized in 1909 for the purpose of taking over the axle business of the Timken Roller Bearing Axle Co., which was organized in St.

tilated, best lighted and best coordinated plants of the country. The main building will be without partitions.

In addition to the main building there is a structure 340 by 60 feet in which will be the heat treating department, which will be equipped with every facility and will be adequate for a very large volume of production.

COMPARISON OF EMPLOYMENT IN AUTOMOBILE INDUSTRY.

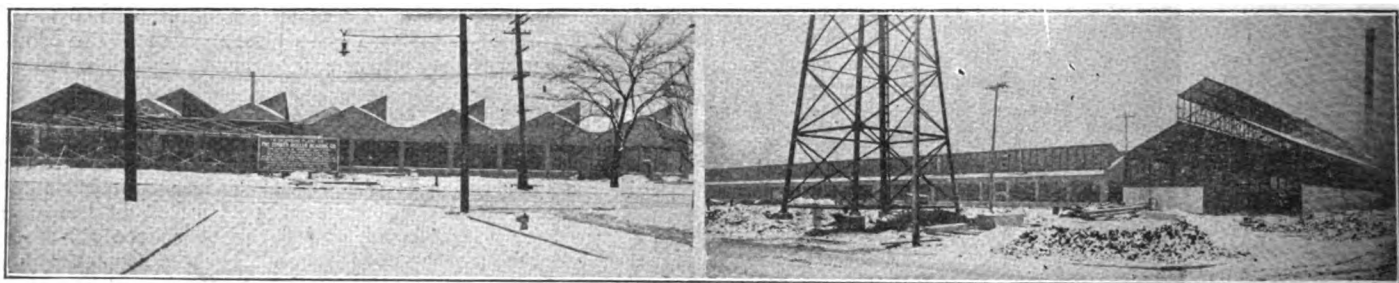
The Bureau of Labor Statistics of the United States Department of Labor has received and tabulated reports concerning the volume of employment in January, 1920, from representative establishments in 13 manufacturing industries. Comparing the figures of this year with those of identical establishments for January, 1919, it appears that in 10 industries, one of which was the automobile industry, there was an increase in the number of persons employed, while in three there was a decrease. The greatest increases, 54.2 and 51 per cent.,

LAURSEN HYDRAULIC GEAR SHIFT AT CHICAGO.

The United States Auto Gear Shift Co., 122 South Michigan avenue, Chicago, Ill., manufacturer of the Laursen hydraulic gear shift, reports an unusual sales record during the Chicago automobile show, at which distributors and dealers in many parts of the country were appointed.

Visitors to the show were impressed by the plainly apparent strength and simplicity of this device. The name "hydraulic" is misleading, because no water is used in the operation of the gear shift. It operates on the oil pump principle. Pressure of the driver's foot on the clutch pedal forces oil into a cylinder which actuates a piston, thrusting the selected gear into place. Selection of the gear is made by means of a small indicator, the point of which turns around a quadrant under the steering wheel. This indicator is set at the desired speed, then the pressing down of the clutch pedal completes the operation of shifting gears.

Women drivers are enthusiastic over



The New Plant of the Timken Roller Bearing Co. at Columbus, O., Now Nearing Completion. At Left, the Front of the Main Building, 500 by 300 feet; at Right, the End of the Structure for the Heat Treating Department at the Rear.

Louis over 20 years ago, beginning with manufacture of roller bearings and axles for horse drawn vehicles, later moving to Canton, O., and engaging in the manufacture of axles for automobiles as well as Timken roller bearings.

This business has now grown to a point where the Timken-Detroit Axle Co. furnishes over 120 customers with axles for passenger cars and trucks, the schedule for 1920 being 255,000 sets. The plans, as outlined now, will provide for 400,000 sets in 1921. This increase is necessary in order that the demands of customers may be supplied.

It has been the practise of the company to put back into the business each year about 75% of its earnings, so that the invested capital today is approximately \$18,000,000, represented by the present outstanding \$3,000,000 of common stock and \$5,000,000 of preferred. It is planned to pay cash dividends on the invested capital at the rate of approximately six per cent. during 1920. Of the capital authorized \$5,000,000 of the preferred has already been sold and over \$2,000,000 of the cash has been invested in plants and equipment.

The principal unit is constructed of structural steel and is a saw-tooth type with seven bays each about 43 feet wide, and when completed it is maintained that it will be one of the largest, best ven-

appear in men's ready-made clothing and woollens, respectively, and the largest decrease, 24.9 per cent., is shown in locomotive car building and repairing.

Eleven of the 13 industries show an increase in the total amount of the pay roll for January, 1920, as compared with January, 1919, and two show a decrease. The most important percentage increases, 149.5, 125.8 and 73, appear in men's ready made clothing, woolen and automobile manufacturing respectively. A decrease of 21.5 per cent. is found in car building and repairing.

The statistics of the automobile industry for the 36 representatives reporting for January of both years, are as follows: Period of pay roll, one week; number on pay roll in January, 1919, 78,126; 1920, 107,559; per cent. of increase, 37.7; amount of pay roll in January, 1919, \$2,091,674; 1920, \$3,617,749; per cent. of increase, 73.

The large increases over last year are stated to be due in part to the decline in the fall and winter of 1918-19 caused by the cancellation of government contracts and uncertain industrial conditions.

Exports for 1919 from this country totalled \$7,922,000,000, as compared with \$6,149,000,000, while imports were valued at \$3,904,000,000, against \$3,031,000,000 in 1918.

the new device, as it does all the "strong arm" work for them, as well as eliminates the danger of stripping gears, because it is impossible to go by accident into reverse. The old-fashioned shifting lever is removed from the car entirely, making room for another passenger on the front seat.

INDUSTRIAL DISPLAYS AT NEW YORK ELECTRICAL SHOW.

Although the date of the 1920 New York Electrical Exposition is Oct. 6-16, practically all the space on the main floor of Grand Central Palace, New York City, where the show is to be staged, has already been reserved. The general manager of this exposition will be George F. Parker.

A feature of importance will be the industrial display, occupying the greater part of the second and third floors, where will be demonstrated different types of electrically operated, labor saving machines. A space 70 by 170 feet on the third floor has been set aside for display of electric industrial trucks such as are used in factories, freight stations, and in similar service for the quick and efficient transportation of freight of all kinds. In addition to the industrial exhibits there will be interesting showings of electric appliances for office and home.

BLACK & DECKER SELLS BALTIMORE PLANT.

The Black & Decker Manufacturing Co., Towson Heights, Baltimore, Md., has sold its Baltimore plant, 105-115 South Calvert street, to the Dieffenbach-Westendorf Manufacturing Co., which is composed principally of the older members of the city, including on the board of directors, O. W. Dieffenbach, William Westendorf, George M. Kimberly, Albert Fankhanel, John Sonnenleiter, Alonzo G. Decker and S. Duncan Black. The Black & Decker Manufacturing Co. is to turn over the special machinery manufacturing business to the Dieffenbach-Westendorf Manufacturing Co., and the former will confine its entire production to Lectroflaters, portable electric drills, electric valve grinders and the Loadometer, a new device for indicating on the dash the amount of load a car is carrying; also a road type Loadometer, which is designed for the use of state police in detecting violations of the road overloading laws.

The officers of the Dieffenbach-Westendorf Manufacturing Co. are: President,

Death of President of Schrader Co.

Dr. Charles K. Cole, president since 1914 of the firm of A. Schrader's Son, Inc., Brooklyn, N. Y., died March 2 at Pasadena, Cal., aged 68. Dr. Cole had the unique distinction of having achieved success in three separate and widely different fields of endeavor. Before attaining prominence as a law maker and public official he had won fame as a physician and surgeon. Later in life he became active in many business ventures and enjoyed an enviable reputation in banking and industrial circles. He had long been a well known figure in the social and political world of Montana, having been president of the state Senate and a founder and director of the Rocky Mountain club.

Dr. Cole was born in 1852 in Plainfield, Ill. Upon graduation from Lincoln university he took up the study of medicine and received his degree from the Miami Medical college at Cincinnati in 1879. After post-graduate studies in New

large manufacturer of brass goods and diving apparatus of New York City, persuaded him to establish a permanent residence in New York.

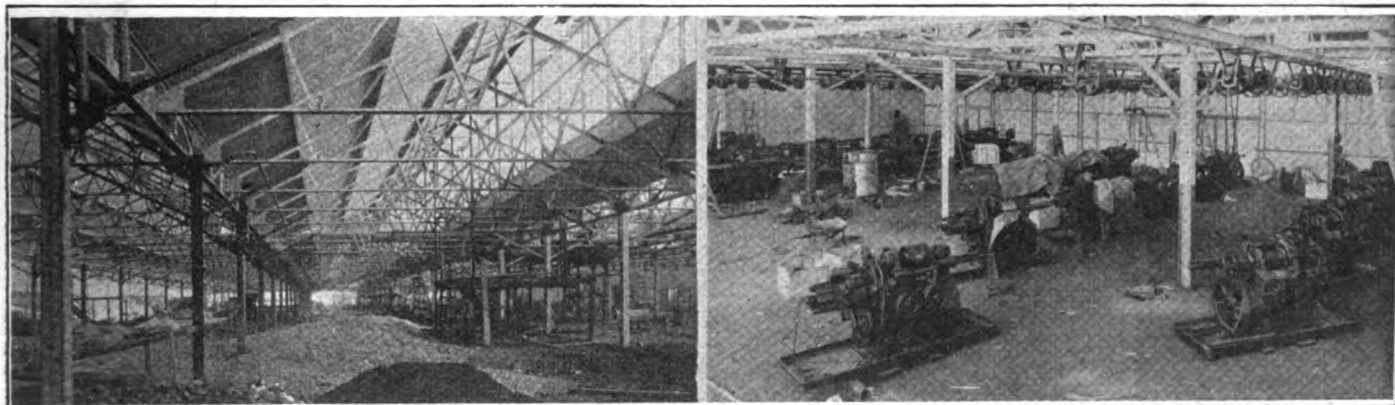
In addition to the Rocky Mountain club Dr. Cole was a member of the Montana club, Old Colony club and the Aero club of America. He also held membership in a number of fraternal organizations, including the Elks, Masonic bodies, Odd Fellows, Knights of Pythias and Ancient Order of United Workmen.

Dr. Cole was married in 1881 to Miss Harriet Gillett, daughter of Dr. and Mrs. P. G. Gillett of Jacksonville, Ill., who survives him, as do two children, Dr. Philip Gillett Cole and Miss Alma Gillett Cole.

INCREASE IN PRICE OF MAIBOHMS.

T. W. Cushing, vice president and sales manager of the Maibohm Motors Co., Sandusky, O., announces a revision in the prices of Maibohm Six models as follows:

Five-passenger phaeton, increased from \$1395 to \$1495; sedan, from \$2100 to \$2395; chassis, including fenders, lamps,



Looking Down One of the Seven Bays of the Main Building of the New Timken Roller Bearing Co.'s Plant. At Right, Erecting Machinery for Production While the Building Is Being Constructed.

O. W. Dieffenbach, formerly manager of the Baltimore plant; vice president and general manager, William Westendorf, formerly superintendent of the Baltimore plant; treasurer, George M. Kimberly, treasurer of the Black & Decker Co.; secretary, John Sonnenleiter, foreman of the milling machine department.

MAYHEW STEEL PRODUCTS TO BUILD PLANT AT HOPEWELL.

The Mayhew Steel Products Co., Inc., manufacturer of mechanics' hand tools and automobile tool kits, whose main offices are at 291 Broadway, New York City, has closed negotiations for a plant site at Hopewell, Va., the former location of a large gun cotton factory. It contains 10 acres of land and on it will be erected a modern structural steel building, which will be devoted to the exclusive manufacture of pliers and wrenches, employing approximately 100 skilled mechanics.

The Mayhew Steel Products Co. now has plants at Shelburne Falls, Mass., and has been engaged in business since 1856.

York and Chicago and in the hospitals of Paris, London, Berlin and Vienna, he took up the practise of medicine in Helena, Mont., and at once assumed a leading position in medical and social circles.

He served at various times as president of the Medical Association of Montana, president of the board of medical examiners of the state, president of the American Academy of Railway Surgeons, but even during the busiest years of his medical practise he took a lively interest in public affairs and his name is written large in the early history of Montana. Among the offices which he filled with distinction besides that of president of the state Senate, were president of the City Council of Helena and president of the Helena Chamber of Commerce.

His business interests in Montana included banking, mining and real estate, but his activities were not confined to that state. He had always been a world traveler and his circle of friends was composed of leading business and professional men in all the principal centers of trade or culture. One of these, George H. F. Schrader of A. Schrader's Son,

tire carrier, hood, cowl, windshield, instrument board and instruments, from \$1290 to \$1385.

The rising costs of material and production are responsible for the increases, according to Mr. Cushing, who states that it is the policy of the Maibohm Co. to maintain the same high quality standards in its product regardless of all fluctuations in the material and labor markets. However, certain refinements will be added which are designed to increase the riding comfort and enhance the appearance of the car.

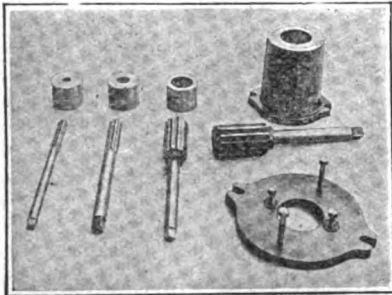
AMERICAN AERO CO. REORGANIZES.

The American Aero Co., Chicago, manufacturer of the Juelson two-bladed fan for automobiles, has just been reorganized, the newly elected officers and directors being as follows:

President and treasurer, F. H. Wellington, South Bend, Ind.; vice president, Col. George M. Studebaker, South Bend; secretary, Paul V. Harper, Chicago; board of directors, F. H. Wellington, Col. George M. Studebaker, Clement Studebaker, Jr., Edward S. Hyman, Edwin Juelson.

ACCESSORIES DEPARTMENT

"Tribune" Transmission Rebuilding Tool for Ford Cars is designed to accurately ream the bushings in the gears of the Ford transmission. The reamers are made from hardened tool steel, especially adapted for this class of work and are provided with the proper guides for the different size gears. It is stated that work that originally took many hours to do with a lathe may now be done in 30 minutes by the use of the Tribune transmission re-



building tool. Each gear is locked in the large casting provided with the outfit and each reamer is piloted through a hardened steel bushing. The large drum has various diameters turned on the inside to accurately take each gear. All that is necessary to be done, it is stated, is to fit the gear having the new bushing, inside the large casting, bolting the large casting to the face plate when the bushing is ready to be reamed.

Manufactured by the Tribune Engineering Co., Oswego, N. Y. Price, complete, \$75.

Stow Suspended Gee Whis and General Utility Tool was designed to obtain extreme flexibility for grinding and to re-



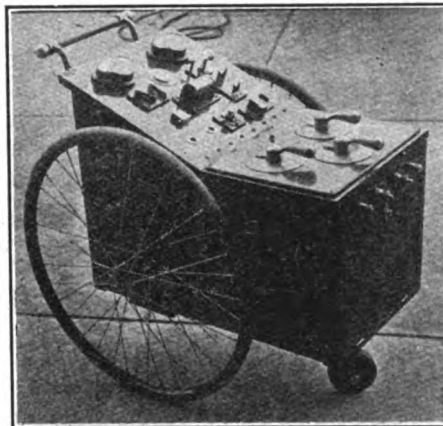
lieve the operator of all unnecessary weight as shown by the illustration. Besides the advantages stated, it is claimed

that the tool provides the ideal method of suspending and driving a flexible shaft, insuring long life and low upkeep. Where the lack of floor space is an object or the operator wishes to work over a bench, such an arrangement gives greater flexibility and allows more freedom of movement. These tools can be supplied for light drilling and grinding and with the long arms it is possible to do work over a large area. The Utility tool is easily moved and can be adjusted for length of arm and height of standard.

The Utility tool will operate from any lamp socket and can be supplied for 110 to 220 volts direct current, or 60 cycles single-phase, alternating or universal current. These outfits are made in four sizes, Nos. 1, 2, 3, 4, supplied with a ¼ horsepower motor for the first three sizes and one horsepower motor for the fourth size.

Manufactured by the Stow Manufacturing Co., Inc., Binghamton, N. Y. Prices on request.

The **Nichoff Test-Kurt** is the latest achievement in the way of a complete testing outfit for locating all electrical trouble in the ignition, starter, generator,



battery, wiring, relays, meters; in fact, anything in connection with the electrical mechanism of an automobile. It is not only a time and money saver to garages and electrical service stations, but also, a convenience to the public, as it will enable the repair man to determine the trouble on the car while the motorist waits, consequently he can be intelligently informed as to what has to be done, and an estimate given on the approximate cost. The wagon is equipped with leads, ready for attaching to any part of the electrical system for locating shorts and grounds. Storage battery fits right in the wagon. All meters are special and of Weston make. It is the ideal rig for general automotive garage service stations.

Manufactured by Paul G. Nichoff & Co., 232-242 East Ohio Street, Chicago, Ill. Price, \$350.

Rie Nie All Rubber Patch is a prepared patch for the motorist, combining patch and cement in a superior article that is applied to the tube puncture with the hands, without the use of tools, and is vulcanized into place by the heat generated by the tire running on the road. Rie Nie patches are made from pure gum rubber



and the best rubber cement obtainable. The manufacturer states that the patch is positively leak proof and makes a lasting repair for rubber goods of all kinds.

Manufactured by the Durkee-Atwood Co., Minneapolis, Cleveland and Toronto. Prices on request.

"Tribune" Camshaft Bearing Aligning Tool for Ford Engines is designed to accurately ream the rear camshaft bearing in the Ford engine and align it correctly with the center and front camshaft bearings. The tool consists of a steel bar of the right size, equipped with two dummy bushings that replace the center and front bushings of the camshaft. After the old



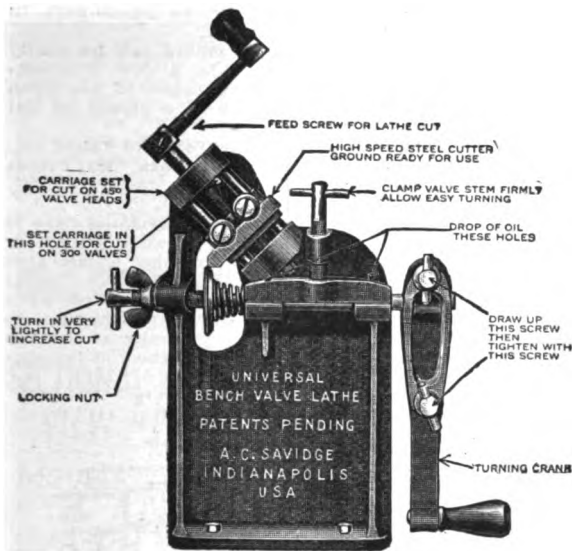
bushings have been removed the rear bushing is replaced with a new one, the reamer is fitted in place and the two bushings on the shaft are locked in place by means of set screws in the same position as the old bushings. In this manner the reamer cuts the rear bushing in line with those of the center and front bearings. The cutter in the tool is easily replaced



when dull so that the life of the tool is practically indefinite. The center and front bushings are usually replaced with new when worn so that the tool need not be used when fitting these two bushings. It is made of hardened steel and finished in a workmanlike manner.

Manufactured by the Tribune Engineering Co., Oswego, N. Y. Price, \$5.75.

(When Writing to Advertisers, Please Mention the Automobile Journal.)



The Savidge Universal Valve Lathe is designed primarily for the service station repair shop. It is a bench tool, combining the desirable features of much higher priced machines, is very simple to operate and does it work with accuracy.

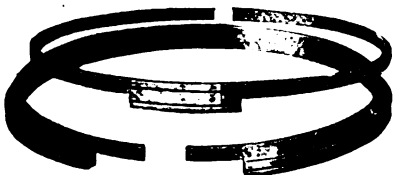
This lathe, it is stated, will reface any valve with 30 to 45-degree heads up to 2½ inches in diameter, and will true the hardest steel, as well as cast iron valve heads.

The valve lathe consists of a base casting that fastens to the bench, a detachable, adjustable turning handle, a removable block placed over the valve stem when refacing the valve, an adjusting screw and spring holding valve face in correct relation with cutter, a high speed steel cutter ground ready for use, a feed screw controlling the cutting tool, an adjusting carriage for 30 or 45-degree valves, and an adjustable screw with wing nut, allowing the tension on the valve head to be increased or decreased.

The Savidge valve lathe is manufactured from the best grades of iron and steel, is finished in gray, nickel plated, and they are guaranteed, the manufacturer agreeing to repair or replace at his option, without charge, except for transportation, any lathe which proves defective, if returned to the factory within one year from date of purchase.

Manufactured by the A. C. Savidge Co., Indianapolis, Ind. Price, complete with high speed cutter, ready for use, \$12; extra cutter, \$1.20.

Ingram Triple Seal Piston Rings show an entirely new thought in design of a two-piece piston ring. They are of two types, regular and De Luxe, which are inserted into piston grooves as one-piece rings and are securely sealed at three points and locked by a lip, thus preventing either of the rings oscillating over the other and opening joints. The locking lip is not an extra part, but is cast as part of the ring itself. Owing to the locking lip securely sealing the joint of the lower ring, while it permits of equal expansion, it at the same time provides a continuous seal at both joints, which prevents the leakage of compression and by-passing of lubricating oil. When the joint of the lower ring opens any distance the open-



ing is protected by the entirely closed upper ring at the point of its positive locking device, the lip. When the ends of the upper ring open any distance on the

(When Writing to Advertisers, Please Mention the Automobile Journal.)

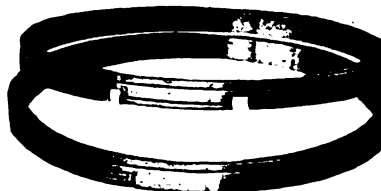
other side, opposite the locking lip, they are sealed by the lower ring. These rings are sealed at three points, over the face and back of the joints. They have equal expansion and contraction for their entire circumferences and give a perfectly equalized contact with the cylinder wall.

The Ingram triple seal piston rings are made from individual castings, of a special mixture of gray iron, and are manufactured to a high degree of finish by improved methods by which the manufacturer claims accurate sizes and that 100 per cent. of their rings are the true round shape.



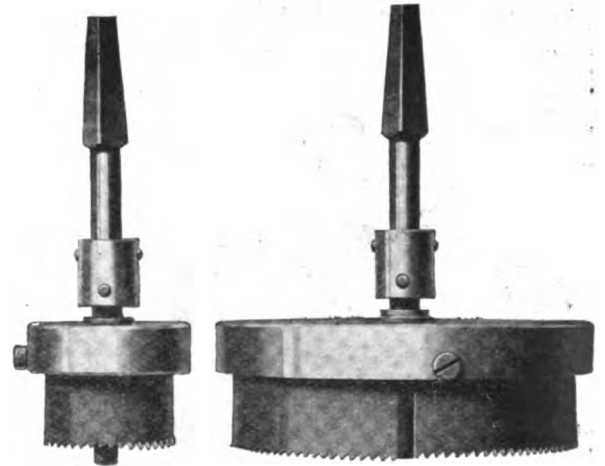
The lower ring is offset, over which the upper ring snugly fits, and the surfaces of rings are provided with oil retaining grooves. The upper ring has a lip that locks the two rings and prevents one ring from sliding around the other and opening the ends. The locking lip also securely locks both rings against any upward or downward motion at the joint.

When cylinders wear larger in the course of long usage it is not necessary to regrind them on account of the perfect wearing contact of these rings on the cylinder walls, which is due to the extraordinary long life of the rolled radial tension put into the rings, also due to their perfect expansion and contact all around



the cylinder wall they show the least tendency to rub and wear the cylinder wall "out of round." The radial tension is put into the rings by the rolling method, which also rolls the name of the ring on the inside. This is patented and used exclusively by the manufacturer of these rings. The leakage of compression and by-passage of oil with these rings is limited to a maximum of two per cent.

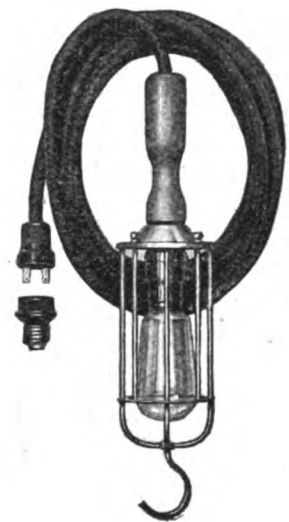
Manufactured by the Ingram Motor Co., Globe Building, 800 Broad Street, Newark, N. J. Prices, De Luxe type, \$1.50 to \$2.25 each; Ford, per set of 12, \$15; regular type, \$1.35 to \$2. Regular type Ford special, per set of 12, \$12.



A New Tool for Cutting Round Holes in Instrument Board of Ford Cars is designed for jobbers and dealers supplying fittings for the new Ford cars equipped with a metal covered instrument board. The two cutting blades are similar to those used in a hack saw, having been tempered and rounded to fit the casting. If a blade is broken a new one is inserted by loosening a set screw. It is stated that by using this tool and a regular hand-curved blade, one can readily cut through the metal covered board in about 1½ minutes.

Manufactured by the Van Sicklen Speedometer Co., Elgin, Ill. Price to the dealer or jobber, \$3.

The Duracord Extension Lamp is designed for hard service in and about the garage or service station where the cord comes in contact with the wheels of cars or trucks, and is liable to kink or break, exposing the wires to short circuits. It is stated that Duracord eliminates this trouble, as it is woven in tubular form, covering the rubber insulation of the wire completely, and is made of a material that will stand severe usage without breaking or pulling apart. A special feature of Duracord is the method of fastening the

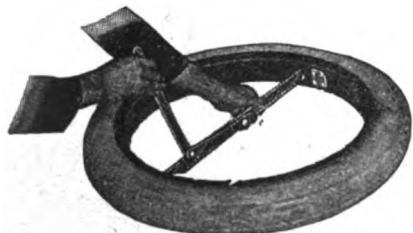


cable to the handle of the lamp, a patented "hold fast" fitting being provided in the handle, which takes all the strain from the terminals and puts it on the cord itself. It is stated that this feature obviates the possibility of the individual wires pulling away from the terminals. Duracord is a portable cord having a special cover woven from heavy cotton yarn, made similarly to fire hose, and will not scratch highly polished surfaces such as are presented on automobiles.

Manufactured by Tubular Woven Fabric Co., Pawtucket, R. I. Prices on request.

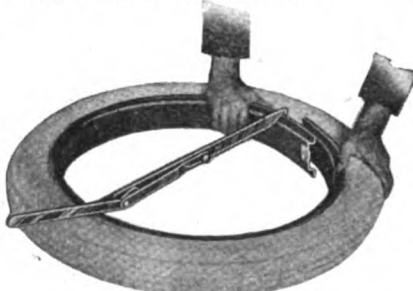
The "G T L" Push and Pull Rim Tool is designed for removing tires from demountable rims with the least effort. The power of the tool, it is stated, is multiplied one to nine, so that by applying a force of 100 pounds to the handle, a 900-pound pressure is exerted at the rim.

The tool is of durable construction, being made of steel throughout, consisting



of two sections, easily assembled when needed for the different sized rims from 30 to 36 inches in diameter.

The larger section consists of a long steel bar, having a hook at one end, and turned flanged edges in which the second section slides when opening or closing the rim. The handle is attached to the first section, a short distance from the hook, and to this is fastened a short bar of steel, having a slot in one end, which fits the opening corresponding with the size of the rim in the second section.



The second section is also provided with a hooked end, similar to the first, these ends slipping over the edge of the rim when being opened or closed.

The tool is made throughout of the best of material and, it is stated, will do practically all work without the use of other tools.

Manufactured by the Metal Products Manufacturing Co., 2416 University Avenue, Minneapolis, Minn. Prices, plain, \$3.50; japanned, \$3.75; white nickel, \$4; bronze, \$4.25; polished nickel, \$5. Adjustable for 30, 31, 32, 33, 34, 35 and 36-inch tires.

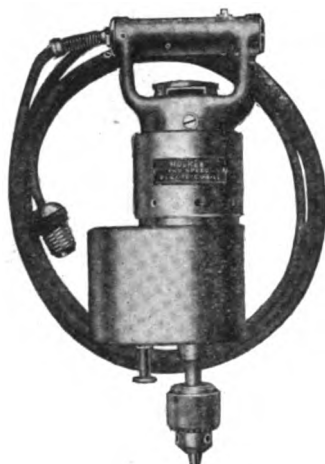
The Huskee Two-Speed Portable Electric Drill was designed to supply an existing demand for an electric drill that would be free from objectionable features peculiar to some tools of this type, at the same time adding a few new and novel improvements that should make it particularly interesting to service station repairers. The two-speed feature is especially effective when metals of different degrees of hardness are encountered, as only a second is required to make the change from a fast to a slow speed and this may be easily done while the drill is in motion. The change of speed is accomplished by simply pulling out or pushing in a pin that is located on the bottom of the gear case.

The gears in the gear housing are attached to shafts (not studs), which gives the gearset a rigidity not otherwise obtained. The housing is grease and oil tight and simply encloses the gearset, protecting it from dust and dirt. Two spirit levels are attached to the Huskee drill, one on the side for horizontal drilling and one at the top for vertical work. This enables the repairer to see at a glance whether he is drilling straight or not.

The "lightning" switch is located in the handle, under the finger tips, and, it is stated, that this is the quickest and most positive switch in action that can be produced, and is claimed to be 100 per cent.

faster than others of like type. It is guaranteed for a period of five years under any and all conditions.

With the Huskee drill is included, free of charge, a substantial wooden stand,



strong and well made, to be used as a holder for the drill when not in use. This in a measure provides insurance that the drill will be kept in proper shape for use.

The Huskee drill is furnished complete with Jacobs geared chucks, stocked regular for 110 or 220 volts, with the motor universal for alternating or direct current.

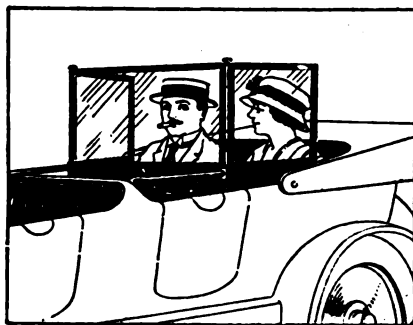
Manufactured by the Consolidated Machine Tool Co., 42-44 Southbridge Street, Worcester, Mass. Price, 110-volt, \$78; 220-volt, \$82. Sold by jobbing trade or may be purchased direct. Specify voltage required.

The J. H. Tonneau or Rear Seat Shield was designed and perfected with the idea of being adaptable for use on any car built and especially for use on domestic cars.

The shield is a patented device that is attached by fasteners at the rear of the front seat and when not in use can be folded down out of the way, occupying about the same space as a folded robe.

The shield consists of a main frame with two folding wings, fitted with a fine quality of glass. A removable water proof apron hangs from the bottom of the shield when in use, affording complete protection from under draughts and keeping the robes clean and dry. When not in use the apron folds over the shield, out of the way.

The shield is mounted on a pair of extending steel arms, which are attached to a pair of steel body irons securely fastened to the frame of the front seat, beneath the upholstery. The shield is firmly attached to the extending arms by means of a pair of heads. A simple turn of these allows the shield to be drawn back and to be rigidly fastened upon its main supports. Once in position, a slight push or pull will open or close the shield or place it in any position desired, where it is held by friction and the locks.



The side wings are held by friction to any angle desired by turning them as a door or shutter. Placed at an angle they

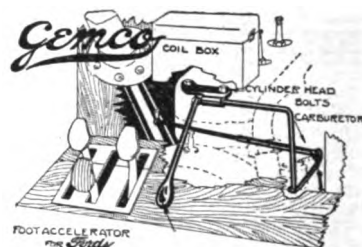
(When Writing to Advertisers, Please Mention the Automobile Journal.)

deflect the wind from the passengers in the tonneau.

The J. H. tonneau shield can be easily attached to any car in a few moments time, giving the advantages of an open car, or the protection of a closed as desired.

Manufactured by the Tonneau Shield Co., Inc., 1777 Broadway, New York City. Prices on request.

The Gemco Accelerator for Ford Cars is designed to be attached in such a manner that the operation of the accelerator pedal will not tire the driver. The pedal consists of a rod bent in the form of a double letter L, attached by a hanger to the two rear engine head bolts at the top of the engine. One end of the rod termin-

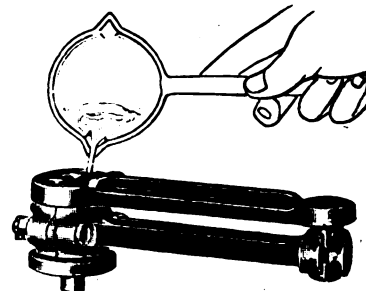


ates in a foot pedal on the floor boards, while the other end is coupled to an arm or rod fastened to the carburetor throttle rod. The action of the accelerator is stated to be entirely independent of the hand throttle and either may be worked without interfering with the other.

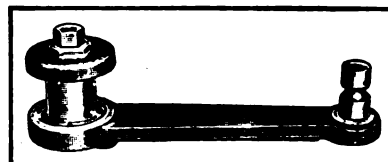
The accelerator is made throughout of the best of material and may be attached in a few moments time by any one handy with tools.

Manufactured by Gemco Manufacturing Co., Milwaukee, Wis. Prices on request.

"Tribune" Babbitting Jig is a patented device with which it is possible to pour new babbit bearings in Ford connecting rod bearings in a simple manner. The jig consists of a pin to take the place of the



wristpin and a stud to form the arbor for the new bearing, both securely fastened at the correct distance apart on a cast arm. The arbor is equipped with a grooved cap, fastened to it by a machine bolt, while the end of the arm is provided with a groove similar to the cap which positions the bearing when held on the arbor. Holes are provided in the fixed end of the arm through which the molten babbitt is poured. The connecting rod is



placed in the jig, the sides of the bearing fitting the grooves above and below, the jig is tightened, placed in a vise and the molten babbitt poured in through the openings in the end of the arm.

The jig is made throughout of the best of material and by skilled workmen and is guaranteed to be accurate.

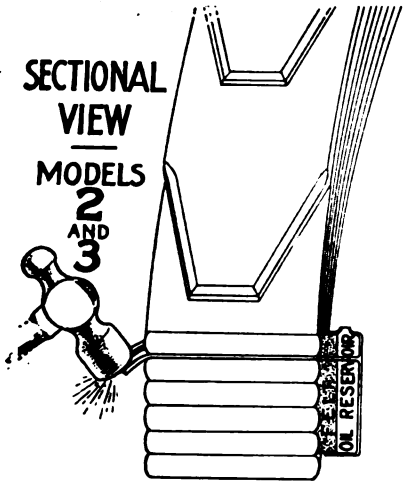
Manufactured by the Tribune Engineering Co., Oswego, N. Y. Price, \$1.50 each.

The G. L. W. Spring Oiler is designed primarily for cantilever springs, the manufacturer stating that it can also be used equally as well on springs of other types, fitting springs five inches wide or less. The oiler consists of a metal container, one side of which is filled with felt wicking, fitting snugly against the leaves of the spring at the side as shown in the illustration. The oiler is fastened to the spring by a thin strip of metal, which

G. L. W. SPRING OILER

SECTIONAL
VIEW

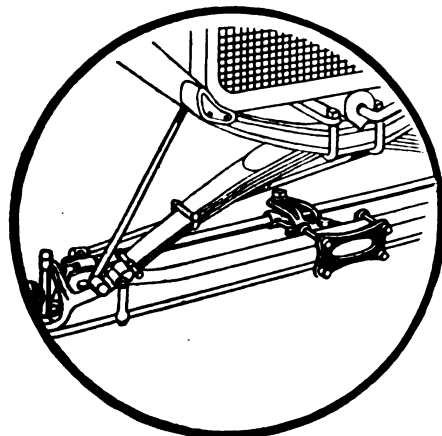
MODELS
2
AND
3



passes through between the top leaf and the leaf under it, and is attached to the spring by bending over the end with a hammer as shown. The insertion of the strip is accomplished by placing a jack under the center of the spring, raising the car body slightly, allowing the spring ends to open enough so that a screw driver can be inserted under the leaf when the strip is inserted. It is stated that this device will keep the spring leaves lubricated and free from rust and allow them to work freely without squeaking.

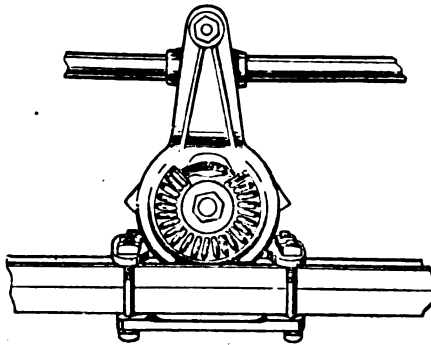
Manufactured by the G. L. W. Spring Oiler Co., Savoy Theater Building, San Diego, Cal. Prices and literature on request.

The Over-Land Guide for Ford Cars consists of a spring actuated attachment connecting the radius rod of the steering gear with the front axle. The device consists of a malleable iron casting shaped in the form of an arm, in three sections. The first section consists of a clamp that is fastened securely to the front axle by four bolts and a plate, the back of which is circular in form, acting as a turntable



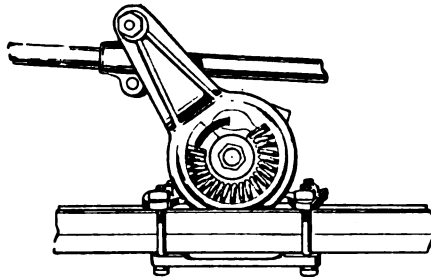
on which the movable arm travels when the steering gear is turned. The second section includes the arm, having a similar shaped circle, which is fastened to the first circle by a large bolt, the two circles being packed in cup grease and, it is stated, are practically weather proof. The third section is made up of a tubular clamp that

(When Writing to Advertisers, Please Mention the Automobile Journal.)



fastens to the radius rod, the end of the cast arm being attached to it by means of a bolt fastening. A floating spring is fitted to the circular plate of the arm, acting as a means of springing the arm back into a central position after the steering gear has been turned to either side.

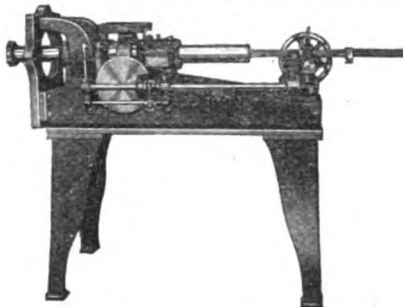
It is claimed that this device will greatly improve the steering of the Ford car, especially when passing over rough roads, thereby saving the front axle steering



gear and its component parts from excessive wear and bending of the parts. The device is made from the best of materials throughout and is guaranteed to give satisfaction.

Manufactured by the Melxell Co., 216 Board of Trade, Indianapolis, Ind. Price, \$8.50, in localities where not represented by the jobbing or dealer trade.

The New Marvel No. 5 Cylinder Reboring Machine is designed for service station machine shops where a high class of cylinder reboring is desired. It is power driven from a line shaft and, it is stated,



is a great labor saver, one man being able to set the machine on a cylinder reboring job, start it, and attend to other work while the reborer is in operation.

The Marvel reboring machine is built for hard service, from the best material obtainable, by skilled workmen. It is equipped with variable feed speeds and an automatic release, enabling the owner to multiply the man power of his shop.

It is stated that this machine is unequalled for accuracy, speed, reliability, capacity and simplicity of operation.

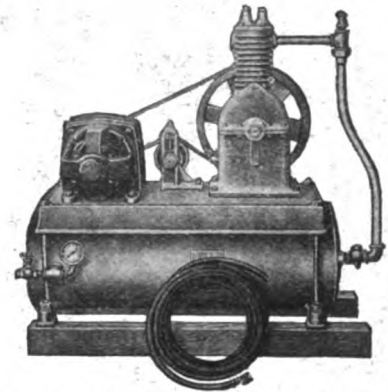
Manufactured by the Marvel Machinery Co., 511 Loan and Trust building, Minneapolis, Minn. Prices and literature on application.

The Curtis Style "V" Motor Driven Stationary Air Compressor is manufactured for garage and service station work, is a self-contained outfit, including all the necessary equipment and possessing the power to successfully handle tire inflation for all sizes of passenger car tires

and many of the smaller pneumatic truck tires.

The outfit consists of a steel tank capable of carrying a pressure of 150 pounds and includes gauge and safety pop valve, the necessary piping between the compressor and tank, as well as dash pot and check valve. Fifteen feet of best oil proof hose with tire chuck is included in the outfit and an alternating or direct current motor as desired.

The Curtis air compressor furnished with this outfit, designated as model "B,"



is the controlled, splashed oiled, air cooled type, with belt fan flywheel, belt tightener and leather belt drive or, if desired, may be furnished with a cut flywheel gear, raw hide pinion and gear guard. The outfit comes mounted on 4 by 4-inch hard wood skids, electric cord, push bar and hose rack not included.

This model of compressor is listed in five sizes with electric motors of five different powers, ranging from 1/4 horsepower to three horsepower on the larger size. Extras may be included, if desired, with prices according.

Manufactured by the Curtis Pneumatic Machinery Co., New York office, 30 Church Street; factory, St. Louis, Mo. Prices and literature on request.

The Manley General Utility Garage Crane is designed for general use about the garage or may be mounted at the rear of a truck body and used as a wrecking crane for towing in disabled passenger cars or trucks. The General Utility crane is complete with wood portable base, mounted on roller casters, and is constructed of steel throughout, except the gearing, which is cast iron, and the base, which is seasoned white oak.

Due to its four-unit construction, it is stated, two men can take it apart and put it together again in five minutes time.



So it can be changed readily into a wrecking crane mounted on a service car or for garage use. Or it may be disassembled, taken in a touring car to the point needed and quickly reassembled.

The General Utility crane is claimed to be especially adaptable for unloading cars or trucks from freight cars, removing cars from ditches and lifting the rear or front ends of passenger cars and trucks.

Manufactured by the Manley Manufacturing Co., York, Pa. Prices, No. 100, 1 1/2 tons capacity, weight 500 pounds, \$125; No. 101, two tons capacity, weight 400 pounds, \$112.

White Stripe Transmission Lining for Ford Cars is made by a new method of weaving, using two separate sets of threads, one set constitutes a frame work running crosswise and lengthwise. Over this is a separate set of wearing



threads, which protect the frame work of the binding threads completely, it is stated, so that white stripe will not come to pieces as soon as the surface threads are worn through. On the contrary, when the surface threads are entirely worn away, there still remains a complete webbing composed of cross and lengthwise binding threads.

To make White Stripe Transmission Lining it was necessary to construct special looms. The wearing threads in White Stripe lining are of the finest quality hose cord yarn, with 21-ply filler in the cross strands, giving great strength, and preventing side spread. Every strand of White Stripe is treated in such a way as to keep the fabric soft and protect it from the hardening effect of hot oil and friction, producing a smooth grip and long wearing qualities.

Manufactured by the Advance Auto Accessories Corporation, 56 East Randolph Street, Chicago, Ill. Prices and literature on application.

The Red Star Timer for Ford Cars is designed for the discriminating motorist who wishes to get the utmost power from his Ford car. The timer case is a metal stamping having an insulated ring of



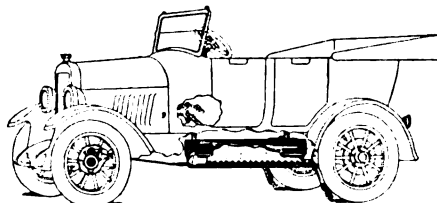
hard fiber fitted inside, in which are mortised contact shoes. It is stated that the wear occurs evenly and smoothly and that the race does not get pitted or bumpy.

The cam roller consists of a hardened steel arm to which is attached the roller contact. This contact works on the principle of a roller on a roller, that is, the pin supporting the inner roller is made fast to it, while the larger contact roller is allowed to roll freely. It is stated that this feature insures a smooth working, accurate timer that cannot drag or wear angular, as it rolls in perfect contact with the race at all times.

Manufactured by the Auto Components, Inc., 56 East Randolph Street, Chicago, Ill. Price, in the United States, \$2; in Canada, \$2.75.

The Antiskid-Sander for Automobiles and Trucks is a new device for which the inventor has recently obtained a patent. It is in two forms, in one of which the sand box is fitted to the running board of the car, one at each side, the sand being moved by a spiral extending the full length of the box and driven by a shaft partly rigid and partly flexible, from a gear attached to the front wheel hub on either side. The sand is forced from the boxes into tubes leading down and in front of the rear tires. The device is operated by a suitable pedal connected with the brake pedal and being operated by the foot brake.

A second form of the device stores the sand in two boxes placed under the rear seat at either side, the sand falling by gravity through two tubes extending down in front of the rear tires. A shut-



ter at the bottom of the boxes is opened by a pull cord passing over pulleys from the steering column. The shutter is closed by spring action. A small pin, located in a metal box fastened to the steering column, operates the cord to the shutter. Pressing down the pin opens the shutter, while pulling it upwards closes it.

The device is not at present being manufactured, but interested parties can obtain full information by writing the inventor.

Invented by David Kupfer, care of Henry Kupfer & Son, 118-120 East 51st Street, Chicago, Ill.

The Tell-U-Motor-Meter is a small dashboard instrument about the size of the average speedometer, rectangular in shape, having an elliptical dial on which are plainly shown the total season gasoline used by the engine, the amount of gasoline in the tank and the miles made per gallon. The amount of gasoline in the tank is registered by the motorist when gasoline is filled into the tank, by turning a small thumb screw at the side. While the miles per gallon and the season mileage of the gasoline is obtained through a connection to the vacuum tank, the gasoline meter operates from the vacuum created by the suction of the pistons in the engine cylinders.

The instrument is also equipped with a regular standard speedometer of the magnetic type, which may be either operated from the hub of a front wheel, or from the drive shaft of the car. The speedometer gives the miles per hour, season mileage and trip mileage.

This instrument has been appropriately called the "Automobile Bookkeeper," as it gives the motorist the information he requires in regard to the fuel cost of operating his car. This device may also be found valuable to truck owners as its use gives a continuous check on the amount of gasoline consumed.

It is stated that at every 10th of a gallon the instrument is automatically corrected. Thus, for instance, if it shows 15 miles a gallon for some hundred miles, with the carburetor adjusted correctly,

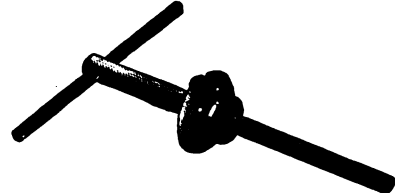


should something else happen to cut down the number of miles, the driver is informed of that fact before more than 1/10 of a gallon has been consumed under the new conditions.

The device is intended primarily for the motorist and not merely for the car manufacturer. It is not expensive, and the fact that it is claimed to be unfailing, accurate and furnishes information that every motorist wants, is expected to make it popular for use on passenger cars and commercial vehicles.

Manufactured by Thompson & Stuber, Rochester, N. Y. Prices and literature on application.

The Junior Safety Reamer for Ford and Fordson is designed to true the valve seats of the Ford and Fordson engine and keep the valves gas tight. The construction is rugged and the tool is designed for accurate work with the least amount



of effort on the repairer's part. The cutter is made of hardened steel and is capable of cutting a true seat, it is stated, regardless of the amount of pressure placed on the reamer T handle by the operator. It is claimed that anyone can



use the Junior reamer, as the depth the cut is not measured by the pressure applied, but by the setting of the high-speed steel cutter.

Manufactured by the A. C. Savidge Co., Indianapolis, Ind. Price, in carton, \$2.25; extra cutters, 60 cents each.

The Greb Bearing and Race Attachment No. 2 is designed to be inserted behind magneto, electric generator and starter bearings and races where it is impossible for the jaws of a puller to be attached. The device is provided with a knife edge which makes insertion easy,

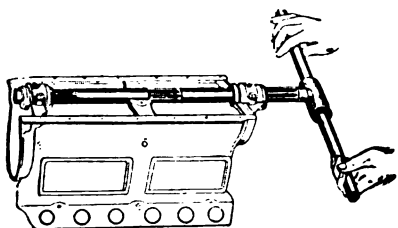


while the puller may be fastened to the attachment and the race or bearing easily pulled. It consists of a two-piece forging, joined by two stud bolts, and tightened by two wing nuts after being located back of the race or bearing.

Manufactured by the Greb Co., Inc., 172-3 State Street, Boston, Mass. Price, \$4.

(When Writing to Advertisers, Please Mention the Automobile Journal.)

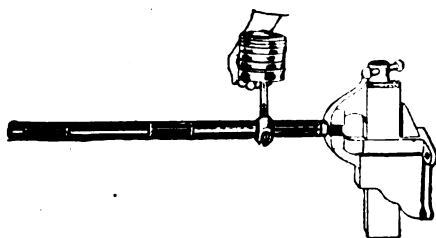
"Tribune" Crankshaft Bearing Aligning and Connecting Rod Bearing Reamer is designed to simplify the fitting of the main and connecting rods, thus reducing the amount of hand work.



The tool consists of a set of three reamers and three pilots formed on a single steel rod and having a squared end to which can be attached a handle for turning the reamers. The pilots are placed in the main bearings of the engine after the crankshaft has been removed, the bearing caps are tightened down and all three bearings reamed at one time. This method



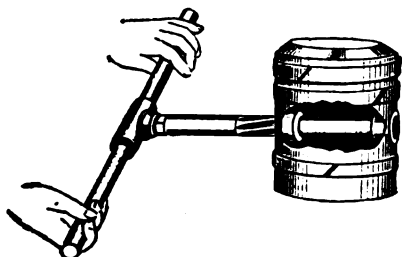
precisely aligns the three bearings and fits them accurately with the crankshaft. The pilots are made .005 of an inch less in diameter than the blades of the reamer, this being found to remove the required amount of babbitt from a worn set of bearings to give a perfect fit.



When used as a connecting rod reamer the tool is clamped in a vise, the connecting rod bearings are taken one at a time, clamped to the pilot and reamed to exact size, the connecting rod being turned by hand.

Manufactured by the Tribune Engineering Co., Oswego, N. Y. Price, \$12.

"Tribune" Piston Pin Bushing Reamer is designed to ream the bushings in the piston bosses. It is made up of two pilots besides the reamer. The front pilot is the size of the new bushing and will pass through the first bushing and enter the



second before the reamer reaches the first bushing. This keeps the reamer in line. The second pilot is the size of the reamer after the bushing has been reamed and causes the reamer to line up both bushings correctly.

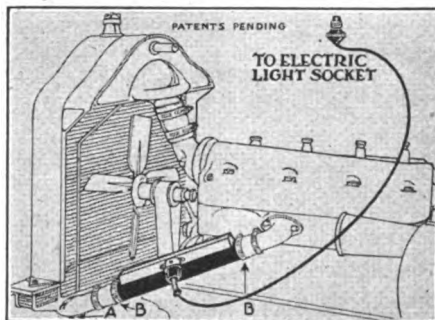


The tool is made of a high grade steel, ground and hardened accurately. It is stated to be fool proof and that it does not require expert workmen to operate it.

Manufactured by the Tribune Engineering Co., Oswego, N. Y. Price, \$3.75.

The Mayall Engine Heater is designed to be installed in the circulating system of an automobile to keep the water warm and the automobile ready for instantaneous service in any weather and in any garage whether steam heated or not.

The Mayall engine heater is an electrical device, easily and quickly installed by the motor car owner and may be retained as a permanent part of the car equipment. Its operation is very simple. Connection is made to any convenient lamp socket in the garage and the current turned on. When not in use the wire

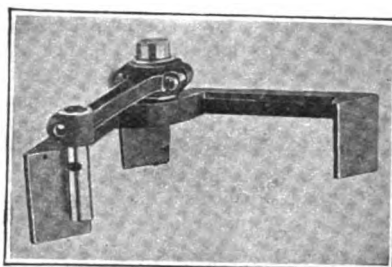


and plug are coiled and tied up out of the way of the working parts of the engine.

The principle of this heater is exactly the same as that of the hot water heating system in a house. The water is heated at approximately the lowest point in the system and naturally rises, creating a continuous circulation. It is stated that the coil in the heater uses about one-half the amount of current needed to operate an electric iron or toaster.

Manufactured by the Knight Metal Products Co., 259 East Willis Avenue, Detroit, Mich. Sold under an absolute one-year guarantee. Price, including extension cord, Ford size, \$10. Other sizes will soon be in production. Jobber and dealer trade solicited.

The **"Tribune" Connecting Rod Testing Fixture** for Ford Cars is designed for testing the alignment of Ford connecting rods and for showing quickly whether or not the rods are bent.

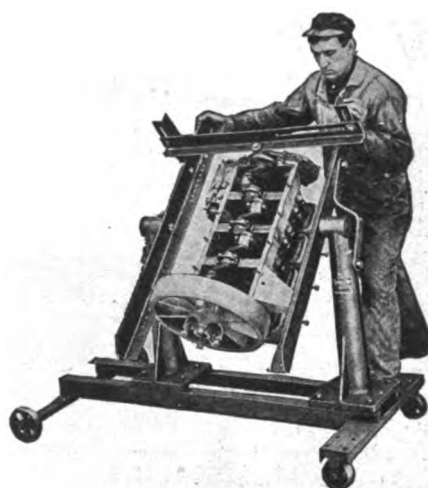


The fixture consists of a three-legged stand, the two outer legs of which are joined to the center leg by arms, the fixture being a one-piece casting. To test a connecting rod, fit the crankshaft end over the large stud at the center, which is the exact size of the Ford crankshaft bearing. Swing the rod in one direction until the piston pin seats against the flat surface. This will show whether the rod is bent. If it is it should be straightened. Then swing the rod in the opposite direction until it touches the other flat plate. This will show if the rod is twisted. When the piston pin rests perfectly parallel with the flat plates the rod is straight. It is manufactured from the best of materials and guaranteed to give accurate results.

Manufactured by the Tribune Engineering Co., Oswego, N. Y. Price, \$5.

The Manley Engine Stand is especially designed to hold the engine in such a position that the repairer can perform work upon it with a greater degree of accuracy, is enabled to see his work better and can turn the engine to any desired angle.

The stand can be purchased mounted or unmounted as desired. When mounted on roller casters it is easily movable to any part of the service station by one man. It consists of a heavy base of angle steel, on

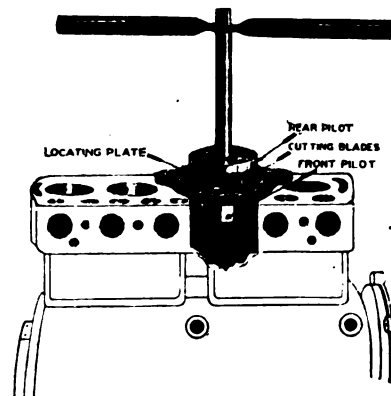


which is mounted the two cast uprights holding the engine frame. The frame is pivoted at the sides to the uprights by heavy shafts, which turn in heavy bearings in the uprights. Slots in the sides of the uprights are connected to the ends of the frame at each side by heavy straps, which allow it to be turned to and fastened at any desired angle. Cross members at the ends provide for lateral adjustment of the frame, so that engines of different widths are accommodated easily and, it is stated, engines of three-point suspension are as easily handled in this frame as four-point.

The Manley stand is manufactured throughout of the best of materials, by men experienced in this class of work.

Manufactured by the Manley Manufacturing Co., York, Pa. Prices, regular, stand, plain and geared, stationary, \$48; portable, \$59; commercial type stand, plain and geared, stationary, \$63; portable, \$74.

"Tribune" Cylinder Renamer for Ford Cars is designed for rapid reaming of Ford engine cylinders and consists of a locating plate which is fastened to the head of the cylinder, a front pilot which is inserted into the cylinder before the locating plate is fastened down, cutting blades which are sharpened and cut only at the front end, and the rear pilot, which is the same size as the reamer. This method is claimed to give a cylinder that is absolutely accurate from top to bottom after it has been reamed.



The reamer is made of the highest grade of steel and is said to need re-grinding only at infrequent intervals and that it can be done by any mechanic who understands grinding tool steel.

Manufactured by the Tribune Engineering Co., Oswego, N. Y. Price for 1-32 (.031) oversize platons, complete, \$26. Any special over-size for Ford cylinders, \$25.

(When Writing to Advertisers, Please Mention the Automobile Journal.)

New Goodyear Girls' Dormitory

WITH an increase in population within the past few years of over 175 per cent., or from 60,000 to approximately 200,000, Akron, O., the



Fine New Dormitory Being Erected at Akron, O., for Girls Employed by Goodyear Co.

rubber metropolis of the world, today is confronted by a house and room famine so acute that it has become necessary for the city's large rubber goods and tire manufacturing concerns to undertake the construction of houses and dormitories for as many of their employees as possible. Thousands of homes now are under construction in Akron, but reports of the steady daily influx of hundreds of men to work in the rubber factories, indicate that many more thousands of homes will be needed this year before even the slightest relief can be afforded for the acuteness of the housing situation.

In addition to its extensive home building program for employees, the Goodyear Tire & Rubber Co. of Akron is paying particular attention to the task of relieving the rooming shortage for its women employees, and now has under construction a large girls' dormitory at Goodyear Heights, a new residential subdivision of Akron, located near the company's factory and main offices. Both utilitarian in purpose and architectural design, the building will provide accommodations for 192 girls, and will include reception parlors, club rooms, sewing rooms, an immense lounge and adequate space for a large dining room.

Complete in every detail the dormitory, which is expected to be ready for occupancy by June 1, will be maintained under supervision of the social service department of the Goodyear company, directed by Miss Clara Bingham. When completed it is expected to create new channels for unlimited expansion of the already extensive scope of Goodyear recreational and social service work among its women employees.

There are now 2600 women among the company's 28,800 Akron employees, 1500 in the factory and the remainder in the general and factory offices. It is planned to make the dormitory privileges accessible to both office and factory girls without discrimination, and to operate the dormitory fundamentally as a place

of temporary abode for new girls coming to Akron, thus providing them with suitable homes until they can find acceptable living accommodations elsewhere in the city.

The dormitory building will be three stories high with a frontage of 125 feet and depth of 92 feet. It will be of red

pressed brick with white ornamental stone facings and will include 96 sleeping rooms, each room having running water and two large wardrobe closets and being so arranged as to accommodate two girls. Leading from the main corridor on the ground floor will be the dormitory wings at either end, with an immense lounge in the center wing, also matron's headquarters and four small guest parlors. Directly above the lounge, on the second floor, will be a commodious sewing room, also reading and writing rooms. In the basement will be laundry facilities for use of the girls, and dining room accommodations.

That the Goodyear company is expending every possible effort to promote recreational and social service advantages for its women employees is shown not alone by the building of the dormitory, but by its extensive program of social service as maintained by Miss Bingham. Factory and office girls are provided with large rest rooms in both the office and factory buildings, in addition to which there are rest rooms for girls in the new \$1,000,000 Goodyear club house, now nearing completion. Goodyear girls also have gymnasium privileges, private shower baths and locker rooms, a large community room and class rooms where domestic science classes are conducted for their benefit.

Goodyear office girls make use of the office lounge every Friday noon for general assemblages, at which times musical programmes are given. Departmental teas are given from 4:30 to 5:30 o'clock every Friday evening. Miss Bingham also has organized a Junior Girls' club for girls under 18 years of age, and encourages office girls taking an active part in the Goodyear Three Arts club, which has planned to present on elaborate scales both "Robin Hood" and "The Sign of the Cross" early in April.

In athletics Goodyear girls have several basketball teams and hockey teams.

Coming Events

April—Topeka, Kan., Show, Passenger Cars, Trucks, Tractors and Accessories. L. W. Warner, secretary, 121 North Kansas avenue.

April—Halifax, N. S., Annual Meeting, Nova Scotia Motor League.

April 1-15—Milan, Italy, International Fair.

April 2-12—Barcelona, Spain, Exhibition, International Business Organization.

April 3-May 4—Buenos Aires, Argentine Republic; exposition of United States manufacturers.

April 4-21—Brussels, Belgium, Commercial Fair.

April 5-10—Gloversville, N. Y., First Annual Automobile Show, Gloversville State Armory. James J. Callahan, manager.

April 6-10—Albany, Ala., Automobile Show.

April 6-10—Wilmington, S. C., Annual Show of Passenger Cars and Commercial Vehicles, Chamber of Commerce. W. D. MacMillan, Jr., chairman.

April 7—Minneapolis, Minn., Meeting, Minneapolis Section, Society Automotive Engineers. Tractor Weights and Draw Bar Pulls.

April 12-17—Rittersville, Pa., Third Annual Car and Accessory Show, Lehigh Automobile Trade Association.

April 12-17—Hot Springs, Ark., Eighth Annual Convention, United States Good Roads Association; Fourth Annual Convention, Bankhead National Highway Association.

April 14-17—Waynesburg, Pa., Annual Automobile Show, Automobile Dealers' Association of Greene County, Armory. F. L. Hoover, Manager.

April 15-29—Basle, Switzerland, Fourth Annual Sample Fair.

April 19-24—Rittersville, Pa., Truck, Tractor and Trailer Show, Lehigh Automobile Trade Association.

April 21-28—San Francisco, Cal., First National Aeronautic Exposition, Exposition Auditorium.

April 29-May 1—Detroit, Mich., Fourth Annual Meeting and Convention, American Gear Manufacturers' Association.

April-May—London, England; commercial vehicle exhibition, Olympia.

May 6-8—Macon, Ga., Annual Automobile Show, Macon Automobile Dealers' Association.

May 9-12—Chicago, Ill., Independent American Petroleum Congress, Congress Hotel.

May 15-20—San Francisco, Cal.; Seventh Annual Foreign Trade Convention.

May 31—Indianapolis, Ind., Seventh International 500-Mile Race, Indianapolis Motor Speedway.

June—Omaha, Neb., Reliability Truck Tour.

June 6-10—Indianapolis, Ind., World Convention of Advertising. Felix M. McWhirter, chairman.

July—Lake Huron Tour.

July—London, England, International Aircraft Exhibition, Society of British Aircraft Construction, Olympia.

July 5—Tacoma, Wash., Tacoma Speedway events.

August—Paris, France, Grand Prix Race, Sporting Commission, Automobile Club of France.

September—New York-San Francisco Glidden Tour.

Sept. 3-12—Detroit, Mich., 71st Annual Exposition, Michigan State Fair Association.

October—Buenos Aires, Argentina, National Exposition of American Manufacturers.

Oct. 6-8—Northampton, Mass., Annual Automobile Show, F. F. & H. Agricultural Society, Three County Fair Grounds. A. J. Morse, secretary.

Oct. 6-16—New York, N. Y., Electrical Show, Grand Central Palace. George F. Parker, manager.

Tarvia-KP
FOR COLD PATCHING

Before the "Tarvia-KP" and stone mixture is placed in the hole, it is carefully cleaned out and the bottom and sides painted with "Tarvia-KP."

First aid for Spring roads--

IF your roads are scarred from Winter frosts and Spring thaws—pitted with ruts and holes—prompt patching with the remarkable "Tarvia-KP" will save expensive repair work in the Summer and Fall.

Those bad spots should be repaired—*now*—before Summer comes with its heavy road-wrecking traffic.

"Tarvia-KP" is extremely easy to apply in big or little quantities. No heating is required. Patches made with "Tarvia-KP" will stand up under the heaviest traffic. It

is the ideal "first aid" for your Spring Roads. "Tarvia-KP" (Kold Patch) is a bituminous road-patching material that can be mixed and stored up in spare moments and used at any time of year to repair any kind of road. It is in a class by itself for making quick, dependable patches.

Send in *your* Spring order for "Tarvia-KP" today.

Our nearest office will gladly send you a booklet showing each step in patching a road with "Tarvia-KP."

The *Barrett* Company

New York	Chicago	Philadelphia	Boston	St. Louis	Cleveland	Cincinnati	Pittsburg
Detroit	New Orleans	Birmingham	Kansas City	Minneapolis	Nashville	Salt Lake City	
Seattle	Peoria	Atlanta	Duluth	Milwaukee	Johnstown	Lebanon	Youngstown
Toledo	Columbus	Richmond	Lafayette	Dallas	Bethlehem	Elizabeth	Baltimore
THE BARRETT COMPANY, Limited; Montreal Toronto, Winnipeg, Vancouver, St. John, N. B. Halifax, N. S. Sydney, N. S.							

(When Writing to Advertisers, Please Mention the Automobile Journal.)



ZENITH CARBURETOR

*All That Its
Name Implies—*

THE HEIGHT OF PERFECTION

You cannot secure more efficient and economical carburetion than by the Zenith. Simplest to adjust, and once adjusted stays adjusted.

Known the world over as the

ZENITH OF CARBURETOR EFFICIENCY

A long list of American builders of cars, trucks and aeroplanes believe this simple, plain tube device to be the best insurance for permanent carburetor satisfaction.

Zenith Carburetor Co.

New York Detroit, U. S. A. Chicago

METZ Master Six

The car of the Year

A New England Product

Honest through and through

\$1895 F. O. B. factory FULLY
EQUIPPED

We are now extending our agency list
Information at request

METZ SALES CORPORATION
BOSTON, MASS.



Giant Searchlight

The highest quality lowest priced
lamp produced.

LIST PRICE With Mirror.....\$6.00
Without Mirror.....\$5.00

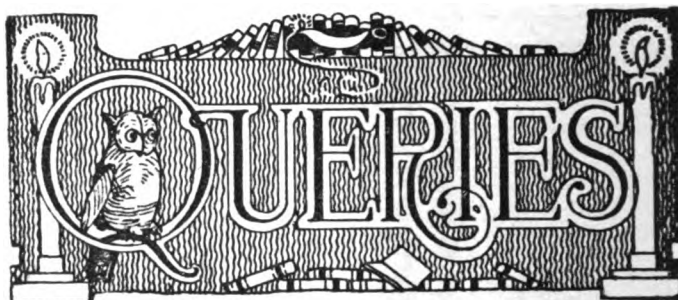
CULVER-STEARN'S MFG. CO.

Worcester, Mass.
Detroit, Mich.

The Automobile Journal

A QUALITY MAGAZINE, WITH PRESTIGE AND CIRCULATION THAT BRINGS RESULTS TO ADVERTISERS

TIMES BUILDING :: PAWTUCKET, R. I.



HIS CLUTCH STICKS.

(W. B. S., Trenton, N. J.)

I have a 1918 ——— car. The engine runs all right, but I cannot put the clutch in. The pedal seems to be fixed fast and will not move front or back. I cannot mesh the gears. Can you tell me what the matter is?

From what you have written we should judge that from lack of proper lubrication the sliding sleeve attached to the yoke, which is in turn fastened through linkage to the foot pedal is "frozen" on to the shaft. Such a condition is serious and requires the aid of a competent repair man. We would suggest that you call upon such a mechanic rather than try to correct the fault yourself.

QUESTION OF TIRE SIZES.

(M. P., Hamel, Mich.)

I have a 1912 Cadillac car equipped with 36x4½-inch tires on front and 38x5½-inch tires in rear. Would it be possible to change these sizes so that I could use 35x4-inch tires on the front wheels and 37x5-inch on the rear? The rims now in use are Q. D.

It is not possible or practical to make the changes that you suggest, without going to considerable expense in cutting down the size of the wheels, fitting new rims and felloes, etc. In the end the work would not prove satisfactory for two reasons: The engine speed would have to be increased to make up for the difference in the size of the wheels, to get the same speed from the car. Also you might not be able to purchase the tires that you wish to use.

The better plan is to equip your wheels with oversize tires. That is, use 37x5-inch on the front wheels and 39x6-inch on the rear. The additional mileage gained will more than offset the higher cost of the oversize shoes, and the riding of the car will be greatly improved. Fitting with the size of tires that you suggest would not be practical when you consider the weight of your car. They would be liable to crush out about as fast as you could replace them.

GEARSHIFT NOISY.

(D. D. J., Pontiac, Mich.)

The gears of my car clash very badly when I shift them. Can you tell me how to stop this?

It may be that the clutch drags sufficiently, even when fully thrown out, to cause the clutch shaft gears to spin, when they should be at rest, and we suggest that you take off the gearset cover, start the engine in neutral, hold the clutch fully out and have some one watch the gears to see whether they stop turning as they should. If they do not, this is one cause, at least, of your trouble and is due either to failure of the clutch to throw out far enough, owing perhaps to the pedal not having sufficient movement, or to failure of lubrication at the clutch bearings, which causes the driven clutch member to be carried around with the flywheel. Plenty of grease on the clutch bearings and a sufficient disengaging motion of the clutch discs should remedy this trouble. The grease in the gearset housing should be of a grade no heavier than that recommended by the manufacturers.

(When Writing to Advertisers, Please Mention the Automobile Journal.)

CARBON REMOVAL.
(P. S., Franklin, Mass.)

What is the best method of removing carbon from the combustion chamber of an automobile engine without removing the cylinder head or causing injury to the engine?

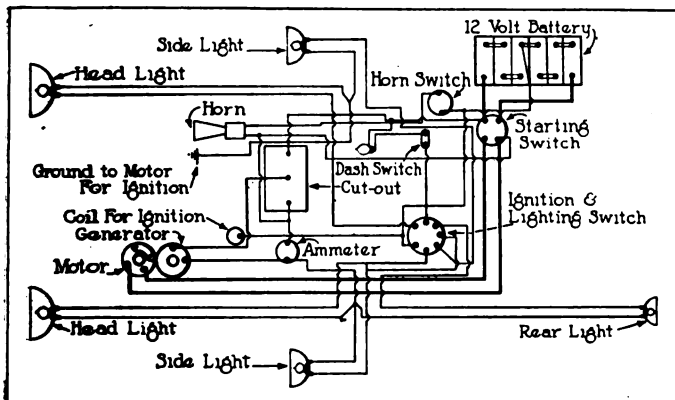
Probably one of the best methods to remove the carbon from an automobile engine is to pour about a teaspoonful of kerosene into each cylinder at the end of the day while the engine is hot, then, with the spark turned off, turned the engine over several times so as to distribute the kerosene and let it stand till morning. By that time the carbon will have become softened and can be removed by blowing out through the exhaust. It is well to repeat this operation every few days, depending upon the amount of use given the car.

If the carbon deposit is the result of long accumulation, it may be removed by scraping, special scrapers being obtainable for this purpose. Oxygen may also be used for burning out the carbon, it being necessary for the operator to remove the plug openings on the heads of the cylinders to facilitate the work. The two latter methods are not as satisfactory for the removal of carbon as the use of kerosene.

WIRING DIAGRAM 1914 AMERICAN. (A. M., Chicago, Ill.)

Kindly publish wiring diagram of 1914 American six-cylinder underslung car.

The wiring diagram of the American six-cylinder under-slung car of 1914 does not show the ignition circuit, but upon inquiry we find that the system calls for a high-tension mag-



neto for the ignition, and as this is a separate unit that is simply short-circuited by a switch on the dash when the operator wishes to stop the engine, it is not shown in the diagram.

Four wires lead from this magneto to the spark plugs and a smaller wire to the short-circuiting switch on the dash, returning to some point on the engine frame, where it is grounded.

TROUBLE IN THE GASOLINE LINE. **(A. L., Boston, Mass.)**

What can stop the flow of gasoline from the main tank to the vacuum tank? The pipe line is clear, but gasoline does not feed through.

If the feed pipe has been blown out with air and is known to be free from the connection at the top of the main tank to the connection on the top of the vacuum tank, there are only two things that might prevent the gasoline reaching the vacuum tank.

Examine the small hole drilled in the top of the main tank cover and see if this is open; if not, run a wire down through it. Remove the strainer from the top of the vacuum tank and if clogged with lint or sediment, clean and replace. The gasoline line should now be clear from the bottom of the main tank into the vacuum tank and gasoline should flow freely into the vacuum tank. If it does not the trouble may be traced to the imperfect seating of the air vent valve of the tank, which will break the vacuum and prevent feeding. Other troubles might be cited in connection with the feeding of the gasoline from the vacuum tank to the carburetor, but they would have no relation to the supply of fuel to the vacuum tank.

(When Writing to Advertisers, Please mention the Automobile Journal.)

Solarine

Conserves fuel and
develops quiet
power

When the going is hard and the engine heats up, Polarine does not run thin and break down. It keeps compression tight and the engine gets every ounce of power out of the gasoline.

Polarine reduces friction to a minimum and lessens the strain on the starting battery. It keeps bearings and engaging parts snug-fitting and operating easily and quietly without racking vibration. Protects against wear and makes motoring pleasanter and less expensive.

Buy Polarine for your engine. Polarine Gear Oil for transmission and differential gears, and power full, clean-burning Socony Motor Gasoline where you see the red, white and blue Socony Sign.

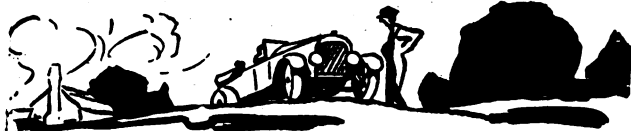
STANDARD OIL COMPANY
OF NEW YORK

New York
Alban7

[Principal Offices :

Buffalo
Boston





Fewer Breakdowns When You Use



A BREAKDOWN can often be traced back to the premature wearing out of a vital part. NON-FLUID-OIL protects gears and bearings always. Preventing under wear and tear. It is strongly adhesive and provides perfect lubrication.

*"K-00 SPECIAL" for Gears
"K-000" for all bearings*

New York & New Jersey Lubricant Co.

401 BROADWAY, NEW YORK

GRANT SIX

*A happy combination of dignity, style
and practical economy*

GRANT MOTOR CAR CORPORATION,
Cleveland.



DIXON'S
GRAPHITE
Transmission and Differential
LUBRICANT

You get more miles, smoother miles, faster miles, easier miles, less-wearing miles, more economical miles with this Dixon Lubricant in your transmission and differential.

Write for Booklet No. 210-G.
Also ask your dealer about Dixon's famous Cup Grease.

Made in Jersey City, N. J. by the
JOSEPH DIXON CRUCIBLE COMPANY
Established 1827



THREE GOOD QUESTIONS.

(W. M. W., Balavia, Ill.)

1.—Is it true that a Ford engine will run from five to 10 revolutions on a prime? That is to say, the gasoline being shut off and the carburetor not feeding any gas whatever. Was under the impression that any gas in the cylinder, regardless of the amount, would explode on the first firing point.

2.—Why is it that kerosene is not recommended for winter use in the cooling system exclusively? Have been asked that question and see no reason whatever why it could not be used.

3.—Should the pressure in the tires be increased as the weather grows colder?

1.—There is always more or less gasoline in the float chamber of the carburetor and with this to help the priming charge, such results as you describe would not be unusual. With all four cylinders primed and the mixture fairly perfect it would take two complete revolutions before all cylinders would have an opportunity to fire, and with these explosions occurring regularly during two revolutions, it would not be unusual for the engine to make several more before stopping. If again the mixture were too rich in, say, two cylinders, it should be possible to get two revolutions or more from explosions in two cylinders and more revolutions from explosions in the others when the mixture gets sufficient air to explode therein.

2.—Kerosene has too low a boiling point, for one principle reason. For another, it would soon dissolve the rubber hose connections to the radiator.

3.—Temperature changes necessitate very slight, if any, variations in tire pressures. Our advice is for you to follow absolutely the suggestions of the manufacturers of your tires.

DENATURED OR WOOD ALCOHOL FOR THE RADIATOR.

(M. T. S., Freeport, L. I.)

Which is the more economical to use in the radiator to prevent freezing, denatured or wood alcohol?

With wood alcohol selling, at present, at about twice the price of denatured alcohol, the latter is much more economical to use. Using the same proportion of wood and denatured alcohol in the mixture, the former gives slightly greater protection against freezing, but not nearly enough to make up for the difference in price in favor of denatured alcohol.

QUESTIONS ON THE WILLYS-KNIGHT 88-4.

(J. S., Jr., Hartford, Conn.)

I have a few questions that I would like to ask you in regard to a 1918 Willys-Knight 88-4 engine:

1. How is the cylinder head removed for the purpose of cleaning carburetor and are any special tools necessary?

2. How is a new junk ring fitted?

3. How will a new bushing be inserted in the top of the steering wheel?

4. How will the play be taken up between the steering arm and worm gear at end of steering post?

5. Would you recommend the use of a body polish composed of the following ingredients: $\frac{1}{2}$ gallon turpentine, $\frac{1}{2}$ pint paraffine oil, $1\frac{3}{4}$ ounces citronella oil, $\frac{3}{4}$ ounce oil of cedar.

6. What kind of grease or heavy oil shall I use in the differential?

7. What kind of grease or heavy oil shall I use in the transmission?

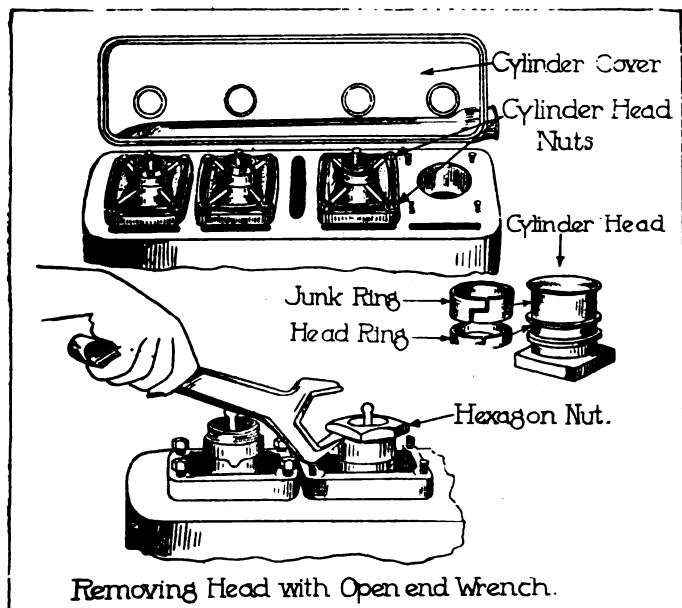
8. How can the oil pump be removed?

1. The cylinder head is removed for cleaning carbon, by loosening and removing the four large hexagon nuts surrounding the spark plugs; these nuts fasten the head cover in place. After the cover is removed it will be found that each head is fastened by four stud bolts and nuts, one at each corner. Loosening the four nuts and replacing the hexagon nut allows the head to be removed by turning the engine over till the compression stroke is reached on the cylinder on which you are working. The pressure of the compression will tend

(When Writing to Advertisers, Please Mention the Automobile Journal.)

to force the head upwards, and this can be helped by using an open-end wrench, resting the handle on the side of the head cover, with one of the forked ends of the wrench under the hexagon nut and prying upwards as the compression pressure is exerted under the head. When the head is loosened the four nuts can be removed and the head taken out for cleaning. The water in the cooling system should be drained before this is attempted, as the fluid covers the heads of the cylinders, as well as fills the water jackets of the engine. The carbon can then be scraped from both the cylinder and piston heads, care being taken not to injure any of the surfaces. All pieces of carbon should be carefully wiped out, that in the cylinder being easiest removed by turning the engine until the exhaust ports, on the left side, are open and by brushing the carbon into the exhaust manifold. From here it will be blown out through the muffler. In replacing the cylinder heads, cover the cylinder head nuts, and it is well to put a little graphite grease on all gaskets and joints to make them water and air tight.

When the engine is dismantled, do not remove the sticky oil from under the rings in the heads, or on the sleeves around the ports; likewise do not clean out the carbon which is packed in the serrations around the exhaust port in the outer sleeves. This deposit serves to make the engine compression tight, and it takes considerable running of the en-



gine to pack these grooves and work the oil in behind the rings.

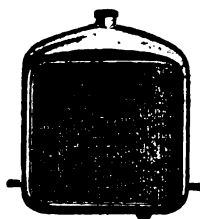
In removing or replacing the heads, have the inner sleeves of the cylinder at the top. The sleeves when in this position allow the rings to be handled easily when setting the head in place. Care must be exercised in handling the paper gasket under the cylinder head to avoid tears and breaks, which will cause a leak.

It is only in exceptional cases that carbon causes trouble in Knight engines by pre-ignition, or otherwise affects their operation. Should there be evidence of an ignition knock that cannot be overcome by varying the position of the spark control lever on the steering column, the engine head should be removed and the carbon scraped from the inside of the combustion chamber. Do not attempt to remove the carbon from around the junk ring.

2. A new junk ring is fitted to the head of the combustion chamber in much the same manner as a piston ring. As it seldom, if ever, requires replacing it is best to have the work performed by an Overland or Willys-Knight service station repairer, as the ring is much larger than a piston ring and the work of installing is more difficult.

3. We do not quite understand what you mean by fitting a new bushing in the top of the steering wheel, as the Willys-Knight car does not have a bushing at this point, as the wheel hub is keyed directly to the steering tube and is locked by a hexagon lock nut. Apparent looseness at the wheel is more likely caused by wear or improper adjustment between the

(When Writing to Advertisers, Please Mention the Automobile Journal.)



JUST
FOR
FORDS



NATIONAL ZIG ZAG RADIATOR

BUILT specially for Fords, National Zig Zag Radiators are more than making good. High standards were set for them, but even expectations have been surpassed. National Zig Zag Radiators are daily teaching thousands of drivers what Ford motor satisfaction really means. Their greater circulating cooling capacity is what makes them so efficient. They reduce operating expense by cutting down oil and gas consumption. And winter radiator ills, so common to others, are unheard of with National Zig Zag Radiators. Extreme expansion and contraction flexibility explains this. Eventually you also will want National Zig Zag satisfaction.

\$24.00 in black.

F. O. B. Detroit—Finished in either nickel or black enamel. Shipping weight complete 35 lbs.

\$30.00 in nickel.

DEALERS.

We are now in position to offer you an attractive agency proposition. Full information upon request.

Let us put you in touch with our nearest dealer.

NATIONAL CAN COMPANY

Detroit

Radiator Department.

Michigan.

V. A. NIELSEN CO.

708 Beacon Street

Boston, Mass.

We Do Any Electrical Auto-Repairs

Immediate Return Reliable Work
Absolute Guarantee

Factory Depot for
Connecticut Ignition
Dealers' Parts List Ready

N. E. Distributors
Stokes Carburetor
Agents Wanted

MAY WE DO YOUR WORK

NEW DEPARTURE BALL BEARINGS

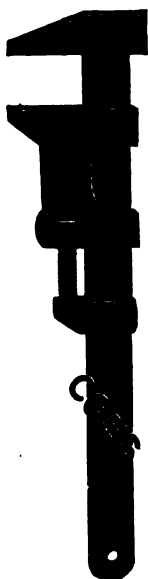


Strength
Stamina
Service



The New Departure Manufacturing Co., Bristol, Conn.
Conrad Patent Licensees

COES *The Standard WRENCH*



WRENCHES that are made for the hardest service. They do not break but grip and hold and their efficiency never lessens.

Economy tools as they last longer, give better service and never become useless through wear.

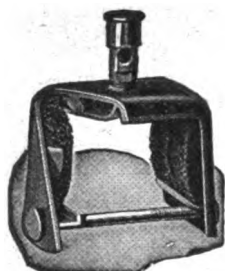
Utility wrenches of the highest order for car owners and repairers as they can be used in compact places and once set hold like a vise.

*The Best Wrench
The Cheapest*

All dealers carry in stock the exact size to meet your need. They recommend Coes Wrenches as all good dealers have for more than fifty years.

COES WRENCH COMPANY
WORCESTER, MASS.

ENJOY SMOOTH RIDING



by keeping your springs lubricated. Brown Oilers automatically filter oil between spring leaves, eliminate rust, stop squeaks and give you solid comfort.

Easily applied. Ask your dealer. Set of 8 oilers, \$10. Money back guarantee.

BROWN SPRING OILER CO.,
6913 Carnegie Ave., Cleveland, O.

PAIGE

The Most Beautiful Car in America

A complete line
of touring and
enclosed models.

Write for Literature.

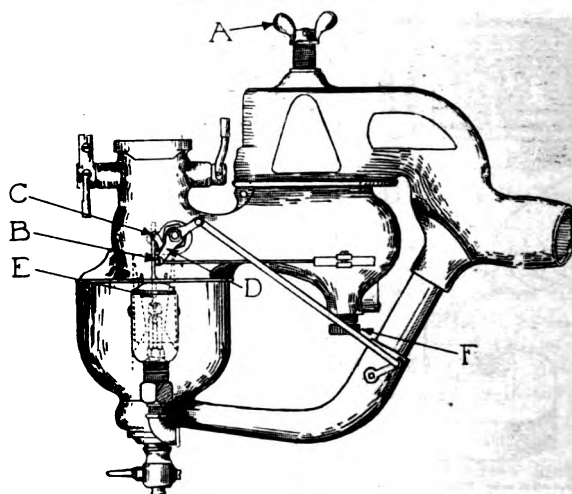
Paige-Detroit Motor Car Co.

DETROIT, MICH.

worm and sector below or between the sector arm and shaft at the side of the chassis frame.

4. To take up the play in the steering gear, loosen the clamp bolt at the side of the worm case and turn the large notched adjusting nut at the top of the case to the right until all up and down motion of the steering column has disappeared. Next turn the steering wheel to the extent of its travel in either direction, and after loosening the nut on the eccentric bushing clamp bolt, move the eccentric bushing until all motion between worm and worm wheel is taken up. Then clamp the bushing tightly again. It is advisable to make this adjustment with the wheel turned to the extreme position, as the most wear occurs on the worm wheel in this position when the car is driven straight ahead. If it were so adjusted that no motion were present at this point in its travel, it would be impossible to turn the wheel far in either direction without its binding excessively. If it is impossible to remove the lost motion between the worm and worm wheel by adjustment of the eccentric bushing, remove the steering arm from the squared worm gear shaft and after rotating the worm gear a quarter of a turn, replace the arm in the new position. This will present a new surface for wear. Then make the adjustment as instructed and carefully tighten the eccentric bushing clamp bolt nut.

5. Regarding the body polish formula on which you ask our opinion, would say that without getting a chemical analysis of the formula we would be unable to inform you whether it would be practical or not. Rather than experiment with



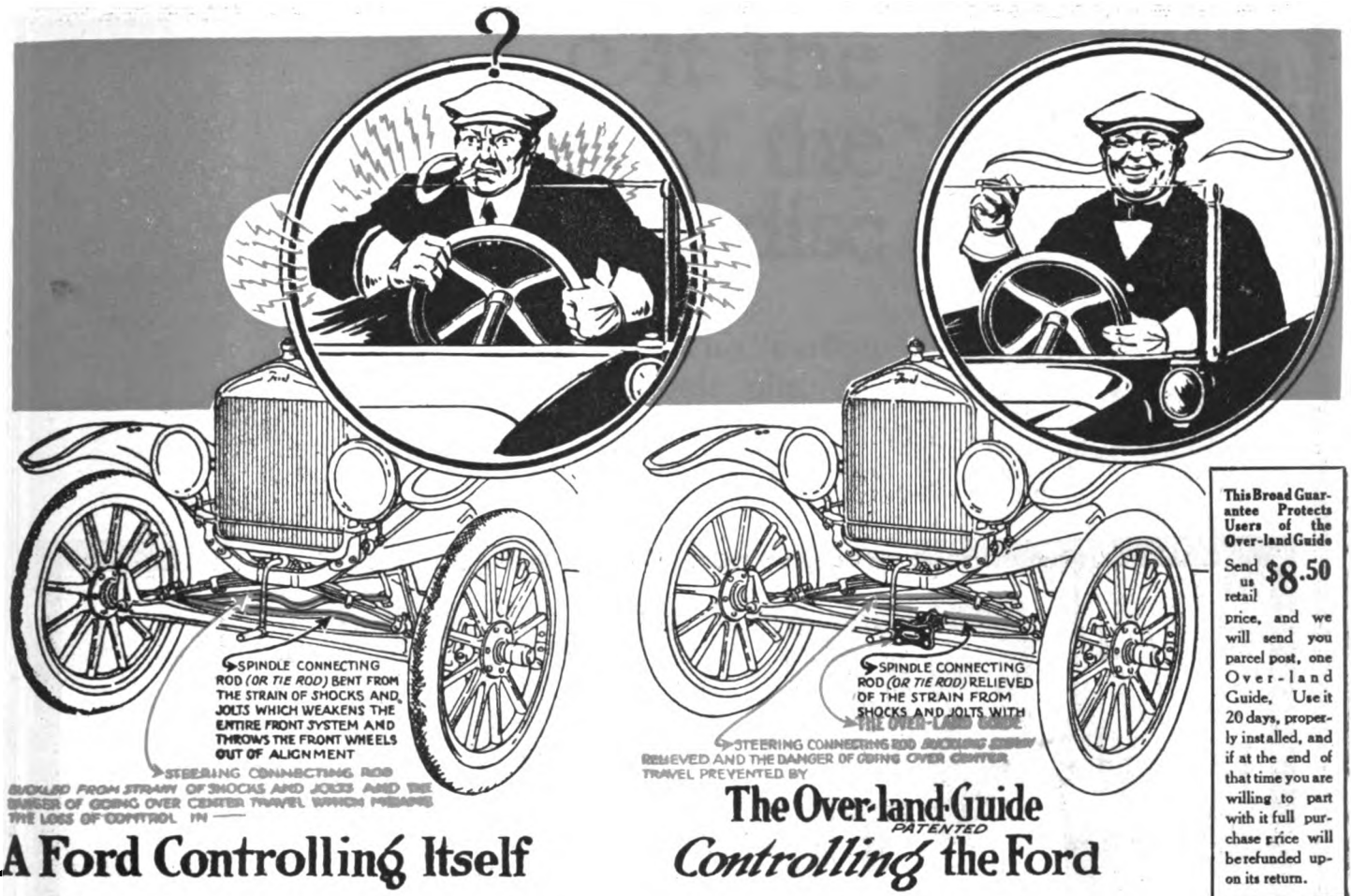
unknown ingredients, we would advise that you purchase one of the body polishes that are already on the market and that can be secured from any automobile supply house. The cost should be less and you will have the advantage of knowing that the polish will do the work for which it was intended.

6. For differential lubrication a heavy steam cylinder oil should be used. This is about as thick as molasses and flows very slowly. This oil has the ability to stay on the face of the gear teeth and thoroughly lubricates them and their bearings.

7. The transmission or gearset should be oiled with the same grade of oil as the differential and for the same reasons. Grease is not adapted for this purpose unless thinned with engine oil, as the gears cut paths in it, and the teeth of the gears and the bearings remain unlubricated.

8. The oil pump can be removed from the Willys-Knight 88-4 engine by dropping the engine base and uncoupling the pump from the eccentric drive shaft. This should not be necessary on this type of engine as the pump is of the plunger type, drawing its oil through a screen in the oil reservoir and forcing it to the bearings and dash gauge under pressure. Possibly all that you will need to do is to remove the strainer and clean it. This can be accomplished by unscrewing the plug under the reservoir, allowing the oil to drain out, after which the strainer can be removed through the plug opening. A relief valve on the side of the engine governs the pressure of the oil, the excess oil, when the pressure is too great, returning to the reservoir.

(When Writing to Advertisers, Please Mention the Automobile Journal.)



A Ford Controlling Itself

SPINDLE CONNECTING ROD (OR TIE ROD) BENT FROM THE STRAIN OF SHOCKS AND JOLTS WHICH WEAKENS THE ENTIRE FRONT SYSTEM AND THROWS THE FRONT WHEELS OUT OF ALIGNMENT

STEERING CONNECTING ROD BUCKLED FROM STRAIN OF SHOCKS AND JOLTS AND THE DANGER OF GOING OVER CENTER TRAVEL WHICH MEANS THE LOSS OF CONTROL IN —

The Over-land Guide
PATENTED
Controlling the Ford

SPINDLE CONNECTING ROD (OR TIE ROD) RELIEVED OF THE STRAIN FROM SHOCKS AND JOLTS WITH THE OVER-LAND GUIDE

STEERING CONNECTING ROD BUCKLING SPRAY REMOVED AND THE DANGER OF GOING OVER CENTER TRAVEL PREVENTED BY

This Broad Guarantee Protects Users of the Over-land Guide
Send us retail **\$8.50**
price, and we will send you parcel post, one Over-land Guide. Use it 20 days, properly installed, and if at the end of that time you are willing to part with it full purchase price will be refunded upon its return.

Are You An Over-land Guide Dealer?

If not, you do not know of this extremely efficient accessory, designed for Ford cars or trucks. None is more useful; there is no substitute for it. No other item of stock will afford greater returns, for the sales are the year round.

You know the demand for articles of quality and merit; these factors impel dealers to recommend Over-land Guides.

Over-land Guides are a well-made 100% efficient utility, sold with an ironclad guarantee to afford satisfaction and economize upkeep and repair expense in a short time that will many times exceed the initial cost.

Distinct Over-land Guide Qualities

It saves tires, parts, repair bills, upkeep and greatly prolongs vehicle service.
It is car insurance of extreme value against skidding, ditching, collisions and personal danger of passengers.
It will protect the car or truck and occupants should the steering gear fall or break.
It keeps the vehicle moving directly ahead; the wheels are aligned no matter what the road surface.
It absorbs road shocks and minimizes the stresses upon the arms and shoulders of the drivers; the machines can be steered with the finger tips.
It minimizes wear upon the vehicle mechanism.
It nullifies danger from a tire blow-out at any speed, for the machine will be kept in its course.
It increases vehicle efficiency, convenience, pleasure and comfort.
It can be changed from one machine to another and will last for years.
It can be installed by anyone in a few minutes.

The Over-land Guide Protects

Wheels
Wheel Spindles
Steering Arms
Drag Link
Radius Rod

Tires
Steering Pivots
Tie Rod
Steering Lever
Spring

Wheel Bearings
Steering Knuckles
Tall Lever
Steering Column
Spring Shackles

List Price \$8.50. If not satisfactory after 20 days' trial money will be refunded.

JOBBERs and DEALERs: Ford car and truck owners buy Over-land Guides at sight. The sales opportunities are unlimited. Our proposition is extremely attractive. Send for particulars today.

THE MEIXELL COMPANY

216 Board of Trade Building,

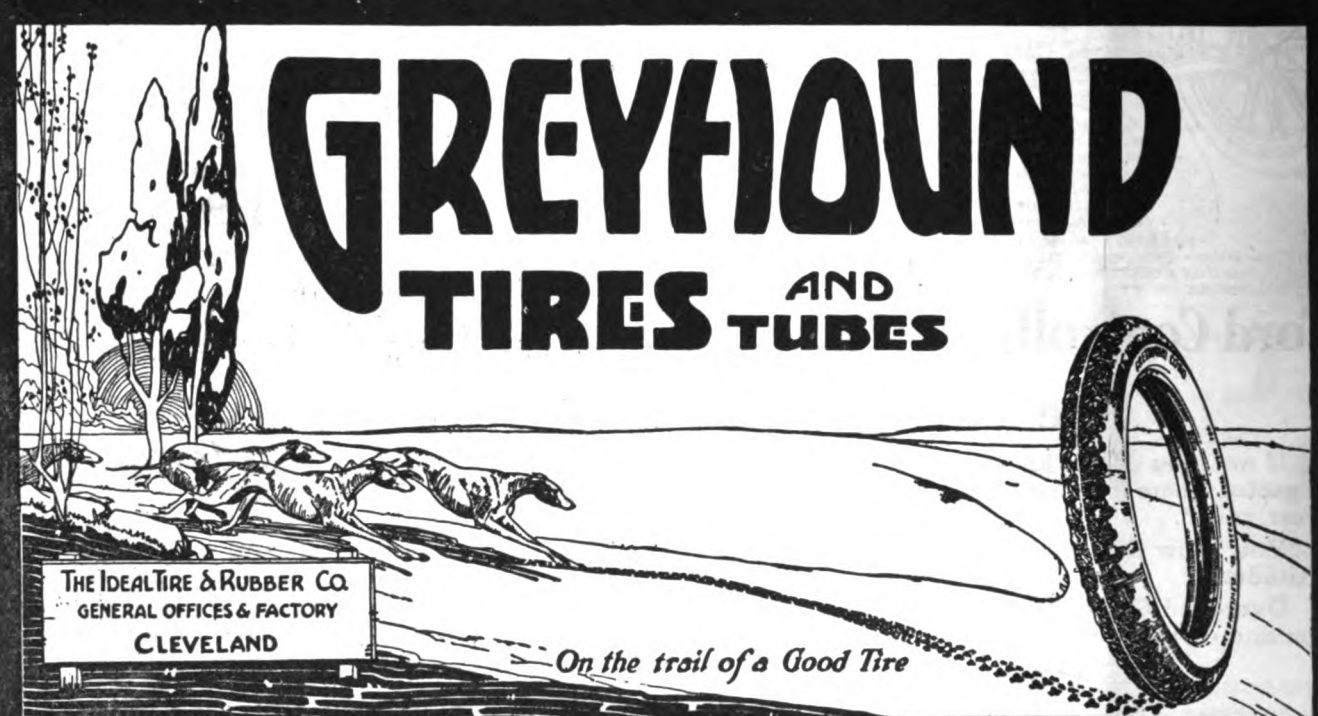
(Automobile Sundries Co., 18 Broadway, New York, N. Y. Sole Foreign Agents.)

INDIANAPOLIS, IND.

(When Writing to Advertisers, Please Mention the Automobile Journal.)



UNLIKE all other STEERING DEVICES the SPRING in the Over-land Guide is completely enclosed and packed in hard grease, which keeps it free from dust and moisture and means indefinite service and no up-keep.



The illustration depicts a landscape with a winding road. On the left, a signpost reads "THE IDEAL TIRE & RUBBER CO. GENERAL OFFICES & FACTORY CLEVELAND". In the center, a pack of greyhounds is running along the road. On the right, a large, detailed illustration of a Greyhound tire is shown. The text "GREYHOUND TIRES AND TUBES" is prominently displayed in the upper right. Below the tire, the slogan "On the trail of a Good Tire" is written.

GREYHOUND

TIRES AND TUBES

THE IDEAL TIRE & RUBBER CO.
GENERAL OFFICES & FACTORY
CLEVELAND

On the trail of a Good Tire

(When Writing to Advertisers, Please Mention the Automobile Journal.)

At the sign of the orange disc

THERE are no "carbon-less" motor oils. Petroleum is a Hydro-carbon product and it is impossible to extract the carbon. Neither is it possible to prevent a portion of the oil from working up into the combustion chamber. Hence, there is sure to be more or less carbon deposited.

Supreme Auto Oil *Leaves Less Carbon*

in the combustion chamber, as it contains no paraffine—most of the free carbon is blown out with the exhaust.

Paraffine forms a gummy substance which collects and holds the carbon, allowing the extreme heat to harden it upon the piston head. A great deal of trouble may be eliminated, therefore, by the use of SUPREME AUTO OIL.



**Look for the
Sign of the Orange Disc**

GULF REFINING COMPANY

General Sales Offices: Pittsburgh, Pa.

DISTRICT SALES OFFICES:

New York
Atlanta

Philadelphia
New Orleans

Boston
Houston

(When Writing to Advertisers, Please Mention the Automobile Journal.)

TRADE MARK
EAGLEINE
 REGISTERED
**MOTOR
 OILS**



EAGLEINE OILS

are unequalled for motor lubrication, freer from carbon, economical because they protect the motor against mechanical wear, and the quantity required is comparatively small.

These are the claims of thousands of motorists,—some with years of experience, who want full value, and more who know the value of high grade lubricants, and who know when they obtain satisfaction.

EAGLEINE QUALITY IS INSURED TO YOU

A grade for every type of motor. It is sold in sealed containers.

*Let us send you our new book and chart.
 It is free at request.*

EAGLE OIL AND SUPPLY CO.
44-45-46 India Street, Boston, Mass.

NEW YORK CITY
Woolworth Building

CHICAGO
1132 W. 37th Street

AUTOMOBILE JOURNAL

INDEX TO ADVERTISERS

	Page
Bancroft Tire Co.....	7
Barrett Co., The.....	41
Boston Auto Tire Exchange.....	6
Brightman Auto Exchange.....	7
Brown Retread Tire Co.....	44
Brown Spring Oil Co.....	48
Coxs Wrench Co.....	48
Connecticut Auto Parts Co., Inc.....	7
Cormack Co.....	6
Culver-Stearns Manufacturing Co.....	44
Detroit Radiator & Specialty Co.....	7
Dixon Crucible Co., Joseph.....	46
Eagle Oil and Supply Co.....	4
Flaherty, Wm. H. Co.....	6
Grant Motor Car Co.....	46
Gulf Refining Co.....	3
Idem Tire & Rubber Co.....	2
India Tire & Rubber Co.....	Cover
Jackson Motor Service Co.....	6
Madison Tire & Rubber Co.....	Cover
Magneto and Generator Exchange of N. E.....	6
Magneto Shop.....	6
Melxell Co., The.....	1
Metz Sales Corporation.....	43
National Can Co.....	47
New Departure Manufacturing Co.....	47
New York and New Jersey Lubricant Co.....	46
Nielsen Co., V. A.....	47
Northwestern Chemical Co.....	5
Pulge-Detroit Motor Car Co.....	43
Pierce-Arrow Motor Car Co.....	Cover
Standard Oil Co. of N. Y.....	45
Stanley Pharmacal Co.....	7
Strandway Auto Parts Co.....	7
Syracuse Rubber Co., Inc.....	Cover
Winther Motor Sales Corp.....	46
Zenith Carburetor Co.....	44

AUTOMOBILE JOURNAL

INDEX TO CONTENTS

Published Monthly by the
AUTOMOBILE JOURNAL PUB. CO.
Times Building, Pawtucket, R. I.

WILLIAM H. BLACK.....Treasurer
DAVID O. BLACK.....Secretary

Branch Offices: New York City, Chicago, Detroit,
Boston, St. Louis, Cleveland.

SUBSCRIPTIONS:

United States and Mexico (Postage Paid) the year \$1.50
Canada\$2.50
Foreign Countries in Postal Union.....\$3.50
The Copy.....20 Cents

PARTIAL LIST OF CONTENTS

	Page
*Mutual Caution and Cooperation the Remedy for Automobile Accidents.....	9
Automobile Dealers' Associations.....	13
*Greater American Car.....	14
*Texas Repair Man Makes Miniature Car..	14
*Humorous Side of Motoring.....	15
*New Porter Car.....	16
*Personal News of Industry and Trade.....	17
*Farm-to-Farm Consumer Sales by Parcel Post	20
*Care and Maintenance of Storage Battery..	21
*Home-Made Aluminum Rectifier.....	23
*Tire Industry and Trade.....	24
*New Syra-Cord Tire.....	25
*Optimism in Car Production, by W. O. Rutherford	26
*Points on Spring Overhauling of the Auto- mobile	27
*Monthly Wiring Diagram, No. 4.....	33
*Glenn Curtiss Designs Motor Bungalow....	34
*Sugar Automobile at Seattle Show.....	34
*New Accessories.....	35

*Indicates Article Is Illustrated.

NOTICE TO SUBSCRIBERS.

The shortage of paper is the cause for the delay in the publication of the April issue of the Automobile Journal.

Paper manufacturers have never before experienced so great a demand, and production has not kept pace. Added to this is the cumulative effect of railroad blockades, strikes, embargoes and other causes of transportation retardation.

Should your copy reach you late, please be patient. The publisher is doing all that is possible to serve you to your satisfaction, but cannot expect to do this until the paper industry returns to a normal output, and railroad congestion reduced. You will continue to receive your magazine as near the date of publication as it is possible to produce it.

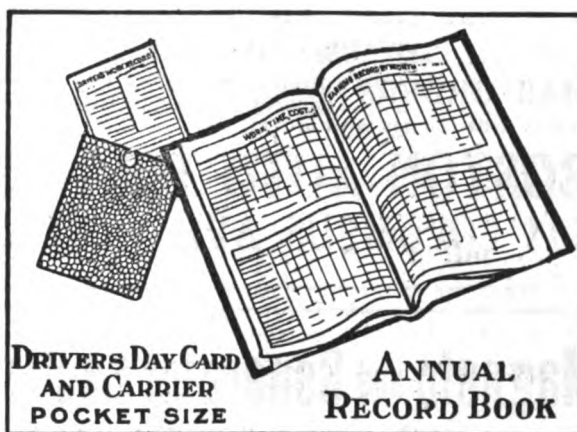
AUTOMOBILE JOURNAL PUBLISHING CO.

Know what it costs to Run your Truck

Learn what your Truck Earns

Know your Truck Profit and Loss

UNIVERSAL MOTOR TRUCK ACCOUNTING SYSTEM



The system includes an annual record book, 350 drivers' day cards, a day card carrier and full instructions.

Any owner can start this system at any time with an old or new truck of any make or type.

Any boy or girl clerk can maintain all records for one or a hundred trucks.

Each system is good for one year, nothing more is needed or necessary.

The records show at a glance any and all items entering into the earnings and cost of operation.

It is extremely simple. 100% complete and full working instructions are supplied with each system.

It is almost self-operating.

Price \$10 — Delivered

Address Record Department

MOTOR TRUCK

Pawtucket,

Rhode Island.

TRADE OUTLET

At 304

Columbus Ave.
For K-E-E-P-S

304

Selling Slightly Used Tires. The Largest Stock in the East. "Your Money's Worth or We Make Good." Remember Our Prices Will Interest You.

Size	Tires	Size	Tires
30x3	\$4.50 down to \$2.40	33x4 1/2	\$12.00 down to \$6.00
30x3 1/2	6.50 down to 3.40	33x5	14.50 down to 8.00
32x3 1/2	8.75 down to 3.90	35x4	10.50 down to 9.00
31x4	8.00 down to 4.00	34x4 1/2	10.00 down to 6.00
32x4	8.25 down to 5.00	35x4 1/2	12.00 down to 6.50
33x4	9.00 down to 5.50	36x4 1/2	12.00 down to 6.00
34x4	10.75 down to 6.00	35x5	25.00 down to 6.90
32x4 1/2	12.00 down to 7.00	36x5	12.00 down to 8.00
		37x5	14.00 down to 6.00

USED TUBES, ALL SIZES, AT \$1.50 TO \$2

MAIL ORDERS given prompt attention. Tires sent C. O. D. with privilege of examination. 5% discount if cash or money order comes with order.

BOSTON AUTO TIRE EXCHANGE
304 COLUMBUS AVE. TEL. B. B. 7329

Magneto and Generator Exchange of N. E.

44 COLUMBUS AVENUE, BOSTON, MASS.

SAVE 50%

Offers

Quality Service for your car.

Starting, Lighting, Ignition.

One year guarantee on repairs and installations of all makes.

Everything pertaining to Auto, Electricity, Magneto and Generator Parts. We have one of the best equipped shops in New England devoted exclusively to this work.

BOSCH, SPLITDORF, EISEMANN, DIXIE, BERLING MAGNETOS
and Parts Always in Stock.



Tires Guaranteed 5000 Miles

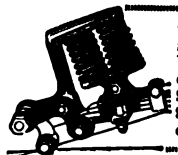
30x3 plain	\$8.00
Non-Skid	\$10.00
30x3 1/2 plain	\$11.00
Non-Skid	\$13.50

Big saving on other sizes and tubes also. Trade in your old tires. 20% deposit required on C. O. D. orders.

Write for lists to

M. Liben & Co.

798 J 7th Ave., New York City.



"CHAMPION" Shock Absorbers for Ford cars. Write for our price. Special offer. Champion Shock Absorber Sales Co., 918 N. Senate Ave., Indianapolis, Ind.

SALESMEN to sell first class Air Pump to garages in New York and adjoining cities. Address Piston, Accessory & Garage Journal.

JACKSON PARTS
ALL YEARS and MODELS

Prompt and Satisfactory Service
Guaranteed.

Jackson Motor Service Co.
Brighton District, Boston, Mass.

Magneto Repairs

Skillfully Done. Assured Satisfaction.
Prompt Service.

The repair work turned out of this shop is of the highest merit—because I know how. If you have electrical and magneto troubles, no matter whether it is a

BOSCH, SPLITDORF-EISEMANN, or any other make, I can fix them. My well-appointed plant, coupled with skilled workmen, assures you of expert magneto service. Send in your magneto. 24-hour shipment.

Rebuild Magnetos, Platinum Parts, Generator Brushes, Bearings, Etc.

Correspondence Invited.

The Magneto Shop

JOHN BRUNSWICK,

187 Massachusetts Ave., Boston, Mass.

Every Ford owner should read "Transforming the Ford." Tells how to secure smooth, positive brake action that no car can excel. A little "transforming" and your car will glide to a quick, quiet stop without the annoying, irritating clatter that you now experience. It will go into low or reverse without jumping or jerking, and you can pick up speed with all the smoothness and ease of a high-priced car. All accomplished without additional expense and the result is a clear saving of 75 per cent. in one direction alone. "Transforming the Ford" tells how it's done. Send for your copy this very minute. 10c stamps or coin. CORMACK CO., Dept. 57, 500 Fifth Ave., New York City.



BOSTON'S Finest Equipped Auto Electric Repair Service

With a staff of trained electrical men we can offer auto owners expert service, coupled with promptness and personal attention to all electrical repair problems. We also repair any electrical equipment used on a motor car. Official service and parts representative for

AUTO-LITE LIGHTING AND
STARTING SYSTEMS.
Complete Stock of
GENUINE PARTS.

All Work and Parts Guaranteed.

William H. Flaherty Co.

74 CUMMINGTON ST., BOSTON, MASS.

(When Writing to Advertisers, Please Mention the Automobile Journal.)

TRADE OUTLET

**LOW
FIRST
COST**

**FULL
MILEAGE**

**REAL
ECONOMY**

YOU'D BE AN ODD FELLOW INDEED

If you did not appreciate the strength of our slogan "On Your OWN Kind of Roads" when applied to our mileage guarantee of six thousand miles for the fabric and eight thousand miles for the cord, when you take into consideration what the roads are and will be this Spring—especially in New England!

It is simply a matter of two-plus-two; here's a tire guaranteed to make the same mileage as other standard tires, "On Your OWN Kind of Roads," and selling for forty per cent. less than others. LOW FIRST COST is not confined to our tires; something in the shape of a tire can be made up to sell at less than we ask; but it is the FULL MILEAGE that makes a LOW FIRST COST a REAL ECONOMY! That is the explanation of the

THREE LINKS

which appear at the head of this ad. Every one of our tires are built by the well-known Record Process, and the standing of that firm, as well as our own, assure you that our guarantee will be kept not only in the letter, but in the spirit. Our money back guarantee affords mail order purchasers the same advantages that they would have if they were here to buy in person; if, when the tires arrive, you don't want them, for any reason under the sun, send them back, and back will come your money without question. And now just look over

The Prices

	Fabric	Cords
30x3	\$12.15	No Cords
30x3½	14.70	No Cords
32x3½	16.60	\$20.75
34x3½	17.75	22.95
31x4	20.10	24.60
32x4	21.20	25.80
33x4	22.70	27.13

	Fabric	Cords
34x4	24.53	29.00
35x4	27.99	30.80
32x4½	29.00	32.96
33x4½	30.01	33.99
34x4½	30.99	35.20
35x4½	32.00	37.31

	Fabric	Cords
36x4½	33.00	38.89
37x4½	34.00	39.90
33x5	34.99	40.90
35x5	36.00	41.76
36x5	37.00	43.50
37x5	39.99	45.00

Cords, 8,000 Miles—Fabric, 6,000 Miles, "On Your OWN Kind of Roads."

The Bancroft Tire Company, Dept. 77

15½ Temple St.,

Record Bldg.

Portland, Me.

RENT OR SALE

MODERN CONCRETE STEEL RAILROAD SIDING PLANT

32,000 SQUARE FEET.

In the heart of Jersey City at the door of the proposed vehicular tunnel; now fully equipped as a machine shop, foundry and blacksmith shop; over 200 machine tools.

15 ton overhead crane.

Complete power plant.

Suitable for machinery builders, auto truck makers, warehouse, etc. Up to date construction. Floor capacity 250 lbs. square ft. BOX 88 AUTOMOBILE JOURNAL.

AUTO PARTS.

50% to 90% Off List.

24 Hour Service. Unlimited Stock.

Pope-Hartford, Columbia, Reo,

Overland and 200 other makes.

Motors, \$20.00 up | E. Presto Tanks, \$4.00

Magnetos, \$3.50 up | E. Presto Tanks, \$4.75

Cylinders, \$3.00 up | Bearings, 50c up

Springs, \$1.00 up | Rims, \$1.00 up

1000 Other PARTS Bargains.

If you want any part not listed here,

Write Us—We Have It.

Conn. Auto Parts Co., Inc.

18-20 Morgan St., Hartford, Conn.

AUTO PARTS—At Your Own Prices. We can supply parts for nearly every make of car. 648 Packards, Interstate Fours, also Truck parts, GMC and other makes.

Write us for Parts. We have them.

STRANDWAY AUTO PARTS CO.,

122-125 E. St., South Boston, Mass.

SPEED OR POWER FOR THE FORD.

Install a set of:

2½—1 Gears in the Racy Type

3 —1 Gears in the Roadster

4 —1 Gears in the Delivery

Our Trade Mark—A star on every gear insures quality.

DETROIT RADIATOR & SPECIALTY CO., 968 Woodward Ave., Detroit, Mich.

WATER POWER PLANT

Fine opportunity to secure property, with water power averaging twenty million gallons by plant daily. Situated sixty (60) miles from New York; number of buildings already erected; ¼-mile private sidetrack to all buildings; big saving in coal account water power. Will consider proposition to sell; or, to right party, would consider selling on basis of small amount cash, balance securities. Splendid chance for expansion of established business or starting of new enterprise. Address XX, care this paper.

AUTO SAVE 50-90% PARTS FOR 400 CARS

POPE, PACKARDS, PIERCE, BUICK, STEVENS-DURYEA, KNOX, OVERLAND, ETC.

Motors, \$35.00 up | Presto Tanks, \$4.50 up

Magnetos, 4.00 up | New Spotlights, 2.00 up

Carburetors, 2.00 up | Generators, 10.00 up

Rear Axles, 15.00 up | Gears, 1.00 up

Front Axles, 5.00 up | Bearings, 1.00 up

Cylinders, 5.00 up | Radiators, 10.00 up

\$12 Diamond Bumpers.....\$5.50

Jobbers in Bankrupt Auto Supplies.

BRIGHTMAN AUTO EXCHANGE

321 Windsor Ave., Hartford, Conn.

FOR SALE.

Extra heavy Copper Stills, especially adapted to distilling water for automobile batteries. One gallon capacity. Shipped C. O. D. \$22.50.

STANLEY PHARMACAL CO.

105 W. Monroe St., Chicago, Ill.
Dept. A 5.

Classified Advertising BRINGS BIG RETURNS

20 Cents a Line, Seven Words to Line.

(When Writing to Advertisers, Please Mention the Automobile Journal.)

Filmed at Gathering of Leading Jobbers in Marietta, Ohio. Nov. 8-12 1919



—And 17 Jobbers were Amazed!

Before an audience of seventeen critical Auto Supply Jobbers, assembled in Marietta, Ohio, the permanency of SE-MENT-OL repairs were conclusively demonstrated when a can, in which several leaks had been SE-MENT-OL sealed, was thrown time and again down a flight of concrete stairs—the can being demolished before a single leak opened up.

In similarly conclusive tests Se-Ment-Ol convincingly proved its rapidity of action and absence of any clogging or injurious effects.

Your jobber, if he was "among those present," will tell you to *stock* SE-MENT-OL—*push* it—and *concentrate* on it. You can back it to the limit.

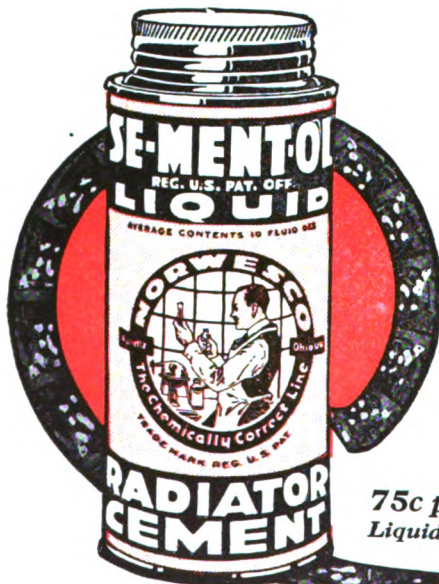
The demonstrations before the jobbers were filmed, and the film will be shown throughout the country through the courtesy of jobbers.

THE NORTHWESTERN CHEMICAL CO.

724 State St.

Marietta, Ohio, U. S. A.

Canadian Factory: Montreal.



75c per can
Liquid or Powder

SE-MENT-OL

The Radiator Repairer That Is Guaranteed for the Life of the Car

(When Writing to Advertisers, Please Mention the Automobile Journal.)

Mutual Caution and Cooperation the Remedy for Automobile Accidents

Alarming Increase in Fatalities Calls for Serious Consideration on Part of All Users of Highways, Pedestrians as Well as Motor Car Drivers

THE mortality report of the United States Census bureau and statistics being received by the National Safety council indicates that during recent years automobile accidents have resulted in approximately one-half the number of deaths caused by industrial accidents of all sorts.

In Chicago, 420 persons were killed in automobile accidents during 1919, in Cleveland 136, in St. Louis 97, in the Borough of Manhattan, New York City, 191 children under 15 years of age were killed by automobiles, and in Greater New York 677 persons met their death in this manner in a single year. In Rochester, N. Y., as many deaths were caused by automobile accidents as by street cars, railroads and industrial accidents combined.

Even more alarming than these statistics is the fact that in almost every case up to 1920, a comparison, year by year, of the number of automobile fatalities and the number of motor cars in use indicates that the deaths are increasing in almost exact mathematical ratio with the increase in the number of automobiles.

In 1910 there were 400,000 automobiles

in the United States and out of every 100,000 population during that year $2\frac{1}{3}$ persons were killed by motor vehicles. In 1917 there were 3,000,000 automobiles in the United States and $9\frac{1}{8}$ persons out of every 100,000 were killed by motor cars. This year it is estimated that 9,000,000 automobiles and trucks will be in use, and the question of how many thousand persons may be killed may well cause serious consideration.

In its monthly report for April of traffic hazards, the National Highways Pro-

tection society announces that in New York City 50 persons were killed by automobiles, 19 of them children under 16 years of age. Surface cars caused the death of four and horse drawn wagons six. Throughout New York state the deaths from automobile accidents reached 82. At this ratio the total fatalities in New York City for the year 1920 will reach 600 and throughout the state 984.

In Rhode Island alone during the past four months six persons were killed in automobile accidents, or at the rate of 18 for the year, while during the same period last year motor vehicles killed 22. During the month of April four persons met their death as a result of motor car casualties in Rhode Island.

If it be assumed that the number of casualties for the year all over the country show only the rate indicated in the figures for New York, already cited, there is a crumb of encouragement for the belief that the peak in the rising mortality from this cause may have been reached. It is possible that there may be less careless driving or that the police regulations for the control of



Old Man Commonsense says to the Motorist:

Don't violate the traffic regulations, especially the speed law.

Slow down when meeting other cars.

Tend strictly to the business of handling the car at all times and don't attempt to do anything else.

Keep eyes open and think about what you are doing every minute.

When road is wet and there is danger of skidding, drive with special care and take no risk of being crowded into the ditch or against the protection beside a steep bank.

Give plenty of room when passing street cars, trucks or other vehicles.

When there is a pedestrian on the right hand and a motor vehicle on the left with scarce room to pass between, either slow down or stop. Take every precaution to prevent accident.

Don't forget to drive more cautiously at night than in the daytime. Most traffic accidents occur after sunset.

It is up to the motorist to watch children on the streets. Upon him is the burden of avoiding accidents. Give a child the advantage of every doubt.

the ever-increasing automobile traffic are beginning to be effective. It may be that both causes are at work.

It is, however, sufficiently shocking to think of a total number of victims amounting to the entire population of a sizable town being wiped out in automobile fatalities every year, and it is extremely apropos that the matter be considered in a spirit of cooperation between all the parties concerned.

Streets were primarily intended for



vehicles and street cars, but that fact must not be considered by a vehicle driver as relieving him from the responsibility of exercising all care not to injure pedestrians. Pedestrians have rights which should and must be respected by the vehicle driver; vehicle drivers have rights which should and must be respected by the pedestrian, but the rights of one should be accorded the other in the spirit having its birth in the common ground of a mutual desire to make the streets of cities equally safe for all their users.

Drivers and pedestrians alike should remember that accidents do not simply happen—they are caused—caused in the great majority of instances by one or all of the three criminal elements—carelessness, thoughtlessness, recklessness.

What the Pedestrian Should Realize.

Pedestrians should realize at all times that their own safety depends in a large measure on their own watchfulness and good judgment. The person who is on foot should never step out from between two vehicles at the curb without pausing to look both ways to see if an automobile is approaching.

The pedestrian should remember that a motor car cannot be brought to a stop as quickly as a horse or a wheelbarrow, but that certain mechanical processes



must be gone through, which take time to accomplish.

Pedestrians should realize that the average motorist is even more anxious to avoid accidents than they are themselves.

In getting off a trolley car watchful care should be exercised. In most states

Some "Safety First" Rules.

Following are the "safety first" rules issued by the Halifax Automobile Association:

"Drive as if every other driver was a born idiot.

"Drive as if all children and most pedestrians were bent on suicide beneath your wheels.

"Drive as if every hill had a chasm at the bottom.

"Drive as if every curve was a highwayman, a Bengal tiger and a stone wall.

"Examine your car before you start, not after you stop—and you won't have accidents."

motor vehicles are not allowed to pass within a certain distance of a trolley loading or unloading passengers, yet pedestrians will often dart out of the safety zone directly into the path of the vehicle which has the right of way.

A pedestrian should never pass behind a standing trolley car without looking to see whether a trolley car or automobile is approaching from the opposite direction.

When a pedestrian sees a motor vehicle approaching in the street he should keep steadily on his way; for the individual to stop still, or to run back, is to court accident, for then the driver does



not know what the pedestrian is going to do and cannot plan accordingly.

In a crowded thoroughfare where a traffic officer is on duty, wait for the officer's signal to "go ahead" and then move from point to point only as it is safe to do so.

In crossing street car or trolley tracks, the pedestrian should step over the track and not on it, as there is always danger of the foot being caught and a serious accident resulting. In crossing a city or town street the safest plan is to cross only at the crosswalks especially provided for this purpose.

Look in both directions before starting to step off the sidewalk. The left is the most important because all traffic should be coming from that direction.

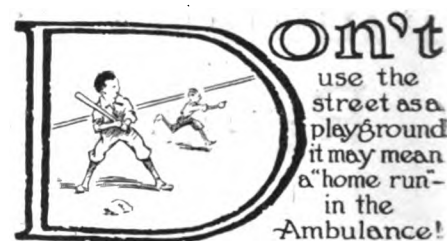
If a car is standing at the corner or moving slowly some distance away, look the driver in the eye to make sure that he sees you and to learn what he is going to do. Do not look at the front of the car. Look at the driver.

When the streets are slippery, don't take a chance in crossing in front of a

car even if the car is moving slowly. A quick stop is impossible for the car under such conditions and your action may cause it to skid and become unmanageable.

Don't read letters or books when crossing a street. Don't talk to your friend, but keep your mind on the fact that you are crossing a street where there is danger and that you must be alert.

Be watchful at all times, for some drivers are not as careful as they should be.



Teach Children.

That the street is made for traffic and not for a playground. Not to play or roller skate in the street.

That extreme caution is necessary in crossing streets where three or more roads converge.

When more than one child is crossing the street they should hold hands tightly and keep together. Don't separate and don't run. The driver can manoeuvre to avoid them even if they become confused, provided they stay together, but if they separate, one or the other is almost sure to be struck.

In playing ball or tennis, if the ball goes into the street, don't run after it without first stopping at the curb to make sure that no cars are approaching.

Above all, they should not run out into the street to hop on behind passing teams, cars or trucks. There is great danger in dropping off as it is impossible for the "ride stealer" to see in both directions and he may fall directly in the path of an approaching vehicle.

"Golden Rule" for Motorists.

Finally, to the motorist: Remember that the "Golden Rule" has a special application to motorists. Treat every other person on the road the same as you would want to be treated if you were in his place.



Don't forget that you can perhaps prevent accidents to other motorists by a little friendly cooperation. Call to a man if he is running with his lights out at night, or if you note that there is something else the matter with his machine which may cause him to meet with an accident.

Electric Roads Ask Cooperation of Motorists

OUT of the thousands of casualties that occur annually in which the motor car is directly concerned, a considerable percentage are caused by collision with electrics. This is graphically shown in the case of Massachusetts, where in a digest of automobile accidents for 1918 and 1919, included in the annual report of the examination and investigation department of the State Highway commission, it is stated that out of a total of 15,113 accidents in that state in 1918 and 20,519 in 1919, 743 in 1918 were due to mix-ups with trolley cars, and 915 in 1919, and this may be considered a fair proportion in other states.

The Rhode Island Co., which operates an extensive system of trolley lines throughout the state, is among the traction companies to strive for the cooperation of the drivers of gasoline propelled vehicles in cutting down the increasing number of accidents between automobiles and electric cars. One of the means adopted is the distribution of an illustrated circular addressed to autoists in which is disseminated information in regard to the traffic rules in force in the city of Providence, which are to the same practical effect as those adopted in other cities, and also calling attention to decisions made by the Supreme Court of the state in regard to the operation of vehicles on the highways. The improper procedure on the part of the motor car driver when crossing electric tracks or

approaching trolley cars, and the resultant danger of accident, are clearly shown by a series of sketches, several of which are herewith reproduced.

The circular states that "careless driving is the great automobile crime, and in time must require restrictive laws that will force the innocent to suffer with the guilty." "Someone," it affirms, "is of course responsible for every accident. If someone had used a little more care the accident could have been avoided. It is not our intention even to suggest that our motormen are never at fault, but it is no more than fair to assert that many times they are not at fault. We are doing all that we can to make motormen more careful."

The substance of the appeal of the Rhode Island Co. to the motorist is as follows:

"A street car cannot run anywhere except on the car tracks; an automobile can.

"A street car cannot turn out of the tracks to allow an auto to pass; an auto can turn out of the tracks to allow a street car to pass.

"The car track is essentially the proper place for a street car; the car track is not essentially the proper place for an automobile.

"The foregoing facts appear to be fairly clear to everyone.

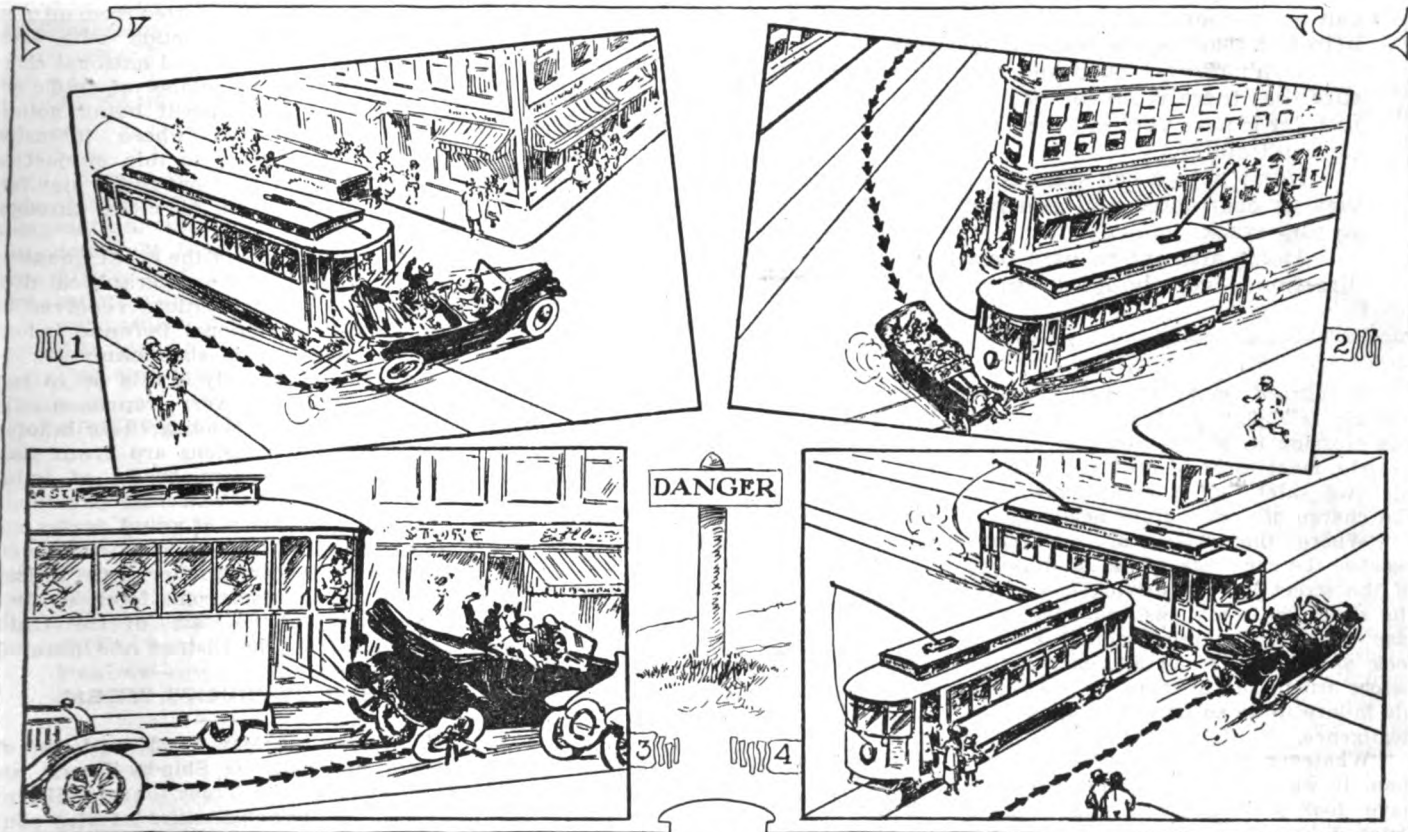
"To the average motorist the street railway track appears to have a fascina-

tion. The safety both of the people and of the motorists themselves, demands that, wherever possible, automobiles shall not be driven on car tracks nor operated along thoroughfares that already are congested with heavy street railway traffic. The auto has its choice of many routes. The street car must go along certain streets.

"Accidents jointly involving automobiles and street cars have been matters of almost daily occurrence. Many of such accidents justly may be attributed to the carelessness of the autoists and of their indifference to the safety of the public. Many such accidents are directly due to the failure of drivers of automobiles to look out for approaching street cars when crossing car tracks. But to reduce such accidents to the minimum, there must be vigilance on both sides.

Another and growing threat to life and limb may be found in the parking of autos oftentimes too deep along the sidewalks of the most crowded down town streets. Frequently only a narrow lane is left for the street cars to pass through and there is constant menace to the passengers who must wend their way, as best they can, between these autos to reach the street cars. The traffic rules, insofar as they apply to the operation of vehicles, are as follows:

"A vehicle, except when passing a vehicle ahead, shall keep to the right and as near the right curb as possible.



Procedure to Be Avoided in Crossing Car Tracks or Approaching Trolley Cars: 1—Shows the Danger of Turning from Right Hand Side of Street to Left on to a Car Track Without Being Sure That There Is No Car Behind Within Striking Distance. 2—Shows the Manner in Which Most Auto Trolley Accidents Happen—Driver Comes Out of Side Street so Fast That He Cannot Slow Up in Time to Avoid Being Struck by Car Approaching in Either Direction. 3—Shows the Danger in Turning on to Car Track When Leaving Curb. Motorist Should Be Sure No Car Is Within 100 Feet Before Turning on to Track. 4—Be Careful in Passing Trolley Car Standing at an Intersecting Track. The View Is Obstructed and a Car May Be Approaching on the Intersecting Track.

"A vehicle overtaking another vehicle shall, in passing, keep to the left, but it shall not leave the line on the right unless there is a clear way of at least 100 feet in advance on the left. This regulation shall apply to vehicles passing a street car which has stopped to take on or allow passengers to alight.

"On approaching a crossing at intersecting streets, also in traversing a crossing or an intersection of streets, and in going around a corner or curve in the highway, a vehicle shall not be driven at a rate of speed other than what is reasonable and proper."

"Now, the average driver does not understand what his rights and duties are as regards street cars. He is apt to feel that he has a right to proceed on and across a street railway track if he doesn't hear the gong of a car. That is not so. The Supreme Court of this state has said:

street car track the driver of a vehicle must have such control of his vehicle that it can be stopped before reaching the track if there is danger of collision with a car. You will notice that the court says that the time to look is immediately before going upon the track. It will make no difference then if a motorman is or is not careless. His failure to ring his gong, or his excessive speed will not affect you. You will be saved from possible serious injury, and we will be spared having to defend a suit. This is good reasoning, isn't it?

"One more thing: If you are slowed down to a speed at which you can stop and see a car 100 feet or so away, wait until it gets by. You can't judge its speed very well, and it may be coming faster than you think. Then, again, the rail may be slippery and the motorman can't stop if you should happen to get stalled.

Uniformity in Traffic Regulations

The urgent need for uniformity in regulations and directions having to do with the control of traffic in cities throughout the country in order that life and limb may be made more safe, continues to be emphasized in the propaganda of the United States Council of National Defense.

Just as the standardization of parts and components of motor cars, trucks, tires, etc., has brought about better conditions in the automotive industry as a whole, so the standardization of traffic regulations, it is pointed out, will bring about better motoring conditions throughout the country.

It would be regarded as absurd, dangerous and impracticable if the law of the road for vessels changed with the passage from the harbors of coastal waters of one state to another. But the use of the average motor car or truck is no more confined to a single state than is that of the average freight or passenger carrying vessel. Every reason for uniform pilot rules on the water applies to the situation in which the operators of automobiles find themselves.

In the interest of both life and limb, as well as from an economic standpoint, which touches the motor industry, some concerted action seems to be necessary if the number of accidents is to be reduced to the extent they should.

Good results are reported from all over the country in connection with campaigns, both of a local and national character, to reduce the number of traffic accidents, this improvement being noticeable in Washington, where intensive study is being given to this subject to the end that improvement there may furnish an object lesson for cities throughout the country.

Not only because of the great quantity, but on account of the geographical division of the communications received by the Council of National Defense indorsing its campaign is significance to be found, but particularly is this so in connection with the very representative character of those sending their indorsements. The expressions are from state and municipal officers, heads of industrial and insurance concerns, presidents of colleges, members of grand juries and those whose interest in such a movement is entirely that of the private citizen. The communications come from at least three-fourths of the states of the Union as well as from the District of Columbia.

"SHIP-BY-TRUCK" WEEK.

The week of May 17-22 will be observed nationally as Ship-by-Truck and Good Roads week. Truck tours will start from all the principal cities of the country and parades will be held in many cities to call attention to the efficiency of this form of transportation, and also to bring about an open discussion of the economic benefits to be derived from national highways.

DONT'S.

Don't turn from the right hand side of a street to the left on to a car track unless you are sure that no car is behind you within striking distance.

Don't cross behind a car on one track so close that you cannot see a distance of at least 100 feet in the direction from which a car on the opposite track may be approaching.

Don't come out of a side street so fast that you cannot stop if a car is approaching from either your right or your left, on the street into which you are entering. This is the manner in which most accidents happen. No matter how blind the corner is, you can have your machine under such control that it can be stopped before it reaches the track, if necessary.

Don't leave a curb and turn on to a car track unless you are sure that there is no car back of you. If there is a car within 100 feet, let it pass you and then turn out. Remember that the electric car can't dodge.

Don't pass a car standing at an intersecting car track. Your view is obstructed and you may be struck by a car on the intersecting track.

Don't attempt to pass between two cars going in opposite directions, even though it appears that you have plenty of time.

"A railroad track, whether steam or electric, is a place of danger, and a person crossing it, whether on foot or in a vehicle, must exercise ordinary care for his own safety to exonerate him from the charge of contributory negligence.

"Where the driver of a carriage reaches the car track at the intersection of the street he was driving upon with the street the track was upon, the exercise of ordinary care required him to look and listen for an approaching car before attempting to cross the track, and his failure to do so must be regarded as negligence.

"Whatever the fault of the motorman, it was the duty of the driver to have looked both ways and to have listened before attempting to cross the track, and to have done so immediately before crossing the track. Failure to do so is sufficient for the court to hold a party negligent as matter of law."

"This means that before going upon a

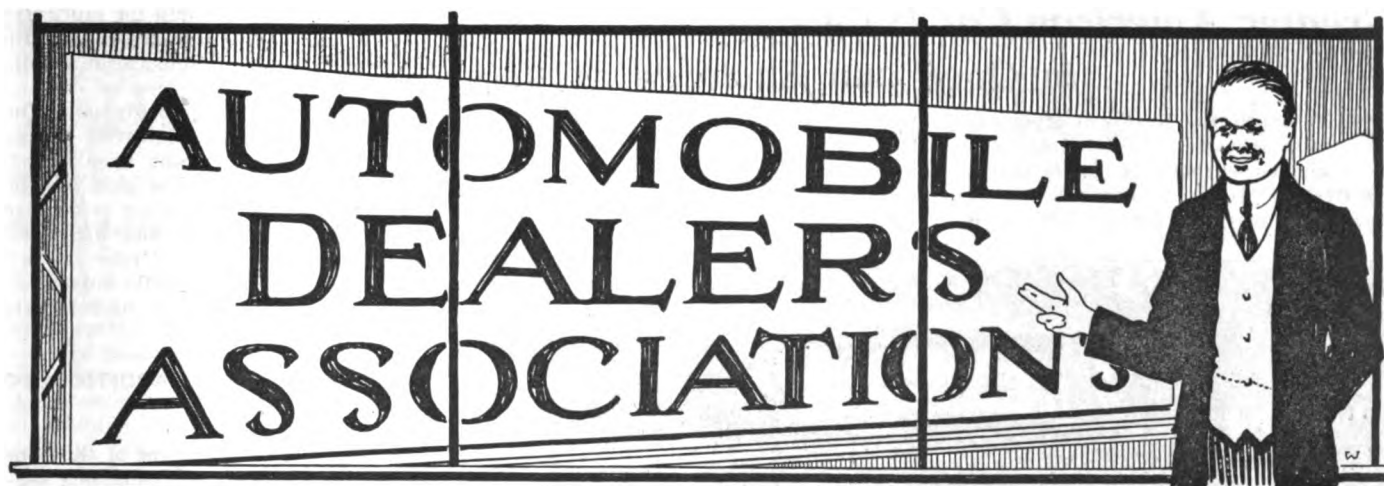
"Look over the speed table given below and see what few seconds it takes to go over 100 or 200 feet at a speed of only 15 miles an hour.

Number of Feet a Vehicle Travels at Certain Speeds.

Miles per Hour	Feet per Second	Feet per Minute
5	7.4	440
10	14.8	880
15	22	1320
20	29.4	1760
25	36.8	2200
30	44	2640

"Please use your eyes as well as your ears. Have your machine under control whenever you approach a track. Remember that a greasy rail makes an emergency stop impossible to a motorman.

Remember that a wait of a few seconds to let a car pass may save you a broken neck."



Intermountain Association Formed

The Intermountain Automobile Dealers' Association has been organized at Salt Lake City, Utah, embracing Utah, Northern Nevada, Southern and Central Idaho and Western Wyoming. The officers are as follows: President, Russell Richards, Salt Lake City; vice president, Gordon Bliss, Blackfoot, Ida.; secretary-treasurer, Charles Backes, Salt Lake City. Headquarters are at 210 Judge building, Salt Lake City.

The association has affiliated with the National Automobile Dealers' Association, and through that organization has individual and territorial representation covering the Northwest.

ARKANSAS DEALERS JOIN NATIONAL ASSOCIATION.

Harry G. Moock, general manager of the National Automobile Dealers' Association, announces that the Arkansas Automobile Dealers' Association has affiliated with the national body, so that membership in the Arkansas association automatically entitles a dealer to affiliation in the National Automobile Dealers' Association.

ARIZONA AUTOMOTIVE DEALERS TO ORGANIZE.

Robert E. Magner, field secretary of the National Automobile Dealers' Association, has been at Phoenix, Ariz., to assist George H. Reuben in the organization of the Arizona Automotive Dealers' Association. Mr. Reuben has been, for three years, president of the Phoenix Dealers' Association, and is a vice president of the national association.

FORM FAYETTE ASSOCIATION.

The motor car dealers of Fayette county recently met at Oak Hill, W. Va., and formed the Fayette Automobile Dealers' association. The aim of the organization will be to not only bring the dealers into closer relation, but also to co-operate with citizens and officials of the county in pushing to completion and maintaining permanent roads.

ST. PAUL RETAIL TIRE DEALERS ORGANIZE.

Fifty tire dealers of St. Paul, Minn., were present at a recent meeting called in that city to form an association of retail tire dealers. F. C. Moyer of the Goodyear Tire & Rubber Co.'s branch office at Minneapolis outlined the need of such an organization for purposes of co-operation and to maintain high business standards. Among the other speakers were E. P. Farley of Minneapolis, representing the tire association in that city; C. P. Ayres of the Goodyear branch, J. J. Coates of the Northwestern Supply Co., St. Paul; Arthur Randall of the Northwestern Tire Co., St. Paul, and William Lewis of the Firestone Tire & Rubber Co. Milton Rosen was made chairman of the committee on organization and to arrange for the second meeting.

Keep the tractor in as dry a place as possible in winter months. Coating the metal surfaces with oil is a splendid protection against rust.

FORTY BRIDGEPORT DEALERS FORM ASSOCIATION.

The automobile dealers of Bridgeport, Conn., to the number of 40, recently assembled at the Black Rock Country Club and formed an association with the following officers: President, L. J. McCracken, Overland-McCracken Co.; temporary secretary, Louis Pawlett, Pawlett-Wilson Co.

AFFILIATE WITH NATIONAL ASSOCIATION.

Among the local automobile dealer associations that have affiliated with the National Automobile Dealers' Association since Jan. 1 are the following: Detroit, Mich.; Hartford, Conn.; Providence, R. I.; Pasadena, Cal.; Worcester, Mass.; Cincinnati, O.

OFFICERS OF NORTH DAKOTA DEALERS.

Following are the officers of the newly formed North Dakota Association of Automobile and Truck Dealers: President, Lee Gowell, Valley City; vice president, G. N. Kenisto, Bismarck; secretary, Harry Miller, Jamestown.

Fort Smith Dealers to Build

The fact that the Automobile and Accessory Dealers' Association of Fort Smith, Ark., was obliged to postpone its automobile show pending the completion of a privately owned building suitable to house a display of the magnitude to which the exhibition developed, has caused the inauguration of a movement to build a permanent exposition in which such events can be adequately staged.

The association passed a resolution endorsing the plan and a committee was appointed to work in conjunction with other local organizations in formulating a method of procedure in getting the movement under way.

A unique feature of the Fort Smith show will be an old fashioned auction sale of used cars. Each local dealer will furnish one car to be put on the block and it will be sold to the highest bidder without reservation.

DEALERS ORGANIZE AT DANVILLE, VA.

The automobile dealers of Danville, Va., have formed a trade organization for the mutual benefit of dealers and car owners. The officers are as follows: President, A. B. Crowell; vice president, Charles K. Carter; secretary and treasurer, W. C. Hilderman.

NEWARK DEALERS TO SUPPORT SERVICE ASSOCIATION.

Nearly 100 men in the automobile trade of Newark, N. J., had a get-together meeting recently to further the interests of the Automotive Service association of Newark. The dealers in attendance expressed themselves as heartily in favor of the association movement and expressed a willingness to support the association in its activities.

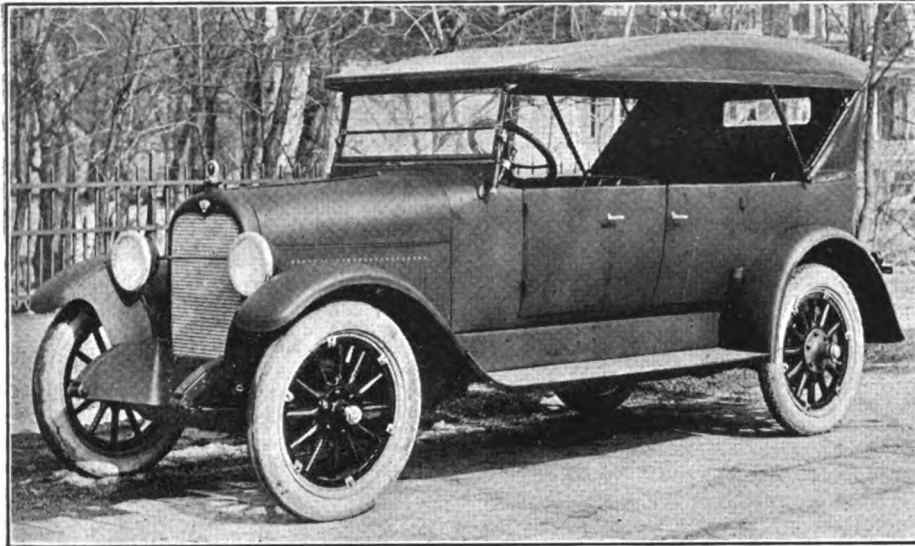
The Baltimore Automobile Dealers' Association is making extensive improvements on its headquarters at 1002 North Charles street, and when completed the association will have one of the most lavishly furnished club rooms in the South.

Greater American Car Is Offered in Open and Enclosed Models

THE American Motors Corporation, with factories at Plainfield, N. J., and Greensboro, N. C., is marketing Greater American cars in five and seven-passenger touring models, three-

rear axle and faced with high grade, heat resisting friction material; equalizes on both brakes.

Springs— $2\frac{1}{4}$ -inch semi-elliptic, $57\frac{1}{2}$ -inch underslung in rear, 39-inch in front;



Greater American Touring Car Made by American Motors Corporation, Plainfield, N. J., 127-Inch Wheelbase and 56-Inch Tread.

passenger roadster and sportabout and seven-passenger sedan, all with 127-inch wheelbase and 56-inch tread. Following are the detailed specifications:

Motor—Herschell-Spillman, six-cylinder, L-head, $3\frac{1}{4}$ -inch bore and five-inch stroke, A. L. A. M. rating 25.35 horsepower; develops 60 horsepower at 2000 revolutions a minute; bronze back, babbit lined bearings of ample size; valves $1\frac{1}{2}$ inches diameter; helical timing gears; three-point suspension; lubrication by splash and force feed from pump located in crankcase.

Clutch—Single dry plate, adjustable from driver's seat; requires no lubrication.

Transmission—Selective sliding gear type, unit with motor; center control, three speeds forward, one reverse; nickel steel gears, double heat treated; main shaft running in ball bearings; Kellogg tire pump, motor driven, mounted on transmission; gear shifter in front floor board.

Axles—Salisbury: Front, drop forged I beam of alloy steel; straight tie rod with extra large bushings; acute turning angle. Rear, three-quarter floating, spiral bevel drive, pressed steel housing reducing weight to minimum; heat treated alloy steel shafts; standard Timken bearings in front and rear axles, with double row annular at wheels and pinion shaft; gear ratio, 4% to one.

Drive—Hotchkiss through semi-elliptic springs with tension type shackles in rear; Hartford universal joints and propeller shaft from transmission to rear axle form a straight line drive under load.

Brakes— $14\frac{1}{2}$ inch diameter external, two-inch wide and 14-inch internal expanding, two-inch wide, both located on

alloy steel throughout; practically flat under load.

Frame—Channel section, $7\frac{1}{16}$ inches deep, $2\frac{1}{2}$ inches wide. Rear springs hung from cross member, relieving frame of all twist.

Electrical Equipment—Gray & Davis lighting and starting, Bendix drive; Connecticut ignition and switch (automatic cut-out); ammeter on instrument board; dash and trouble light combined; fuse block with extra fuses mounted on door in dash, easily accessible. Illuminating lamp on swinging door under hood and cowl; all wires concealed.

Carburetor—Stromberg type LB-2, $1\frac{1}{4}$ -inch diameter, with choke control on instrument board; throttle on wheel and accelerator pedal of approved design on toe board.

Feed—Stewart vacuum system; gasoline tank of 20 gallons capacity, mounted at rear of frame.

Cooling—Three-blade pressed steel fan in rear of cellular type, aircraft radiator; water circulation by centrifugal pump; all connections readily accessible.

Steering Gear—Irreversible worm and gear type, easily adjustable for wear; rigid stationary column spark and gas control above wheel; 18-inch notched walnut wheel with polished aluminum spider.

Tire Equipment—Cord tires, 32 by four-inch, ribbed front and non-skid rear; toggle locking type tire carrier, equipped for padlock, rigidly supported on rear of frame; extra rim.

General Equipment—Rain vision type windshield, absolutely rain proof; upper and lower panels both adjustable; motor; electric horn; Van Sicken speedometer driven off rear of transmission; long handle jack and complete set of

tools; Alemite grease gun for lubricating springs, axles, steering gear, drag link and brake bearings, lubrication applied under pressure.

Standard Touring Car Equipment—One-man five-bow top of approved design; Collins type side curtains opening with door, Johnson bevel plate glass window in rear; upholstery in long grain black leather, French plaited and fitted with genuine Marshall springs; robe rail with nickel hand grips; foot rail; outside and inside door handles—all nickel plated over brass; rust proof.

WESTCOTT BUILDS ADDITION TO FACTORY.

The addition to the plant of the Westcott Motor Car Co. at Springfield, O., is completed, and will be used as a warehouse and to house the motor testing department. The extension is 125 by 250 feet, and its use will release a large section of the main factory for manufacturing purposes.

Additional machinery and equipment have been installed, including a new set of electric ovens for the paint department.

TEXAS REPAIR MAN MAKES MINATURE CAR.

The accompanying illustration shows a miniature motor car manufactured by Franz Reuter, who operates an automobile repair and general machine shop at 111 Cameron street, San Antonio, Tex.

While made primarily for the amusement of Mr. Reuter's children, this little car affords real service and has proved practical in its operation in the limited field for which it was designed.

Mr. Reuter states that it took him about 18 months to build the car and that the materials were odds and ends picked up in his shop. It has a 50-inch wheelbase, 28-inch tread, 18-inch wheels, and is operated by an electric starting motor and storage batteries. It is equipped with solid tires, but Mr. Reuter wishes to change the rims to fit 20 by two-inch pneumatic clincher tires.

Both of Mr. Reuter's children, Fritz Reuter, Jr., aged six years, and Charlotte, aged four, can operate the car.

The French government presented to the marshals and leading generals of that country the motor cars they used during the war.



Miniature Car Made by Franz Reuter, San Antonio, Tex.

HUMOROUS SIDE OF MOTORING

MYSTERIOUS RATTLE LOCATED.

A Falls avenue man driving south of the city in an automobile caught up with several children, who appeared to be on their way to a picnic. "Jump in," he invited, and in they jumped.

A few moments later the man stopped his machine, got out and walked all around it, inspecting the fenders. After another mile or so of driving, he again stopped and inspected the engine. After another short interval he stopped to look under the machine and test several bolts.

"My gracious, that's funny," he exclaimed.

"What's the matter?" one of the children inquired.

"There's a rattling somewhere and I can't locate it."

"What kinda rattling?"

"O, I don't know. Sounds as if something is loose."

At this point one little boy suggested: "Maybe it is these table knives and spoons rattling in our coffee pot."—Youngstown Telegram.

ACCEPTED AS A SUBSTITUTE.

"How did they happen to meet?"

"He ran over that poodle of which she was so fond."

"Did he replace it?"

"Looks that way. He and she are now engaged."—Stray Stories.

STEPPED ON IT.

"What was he pinched for?"

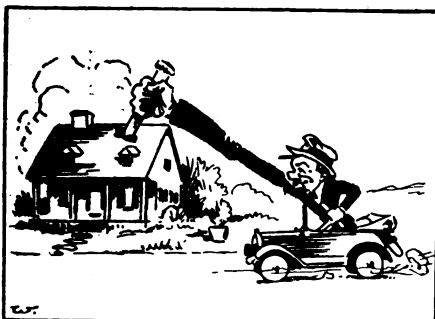
"His father let him use the auto for an hour."

"Well?"

"He tried to ride an hour in 15 minutes."

EXTENUATING CIRCUMSTANCES.

A Youngstown, O., motorist, charged with exceeding the speed limit, got a suspended sentence when he admitted to the judge that he'd been driving a trifle fast, but pleaded extenuating circumstances in that he had just heard of a house for rent and was hastening to "nail it."



LOOKED LIKE FLOODS.

A farmer who was spending the day in the city with his good wife, remarked to her in rather anxious tones, on seeing a boy go by carrying an automobile tire:

"We'd better get along home at once, Martha; it looks as though they're expecting big floods in town. That's the third chap I've seen today with a life belt on."

ACCOMPLISHED CONVERSATIONALISTS.

In a little road house not far from Boston, in the good old days when such places were more frequent and cheering than they will probably be this summer, two motorists sat. They sat for a long time. "Say," said one, after a long silence, "you know Bill Smish of Wooster?"

"Wash his name?" queried number two.

"Who?" his companion rejoined.

ALMOST TOO ACROBATIC.

Dealer—Let us show you our latest machines. We have a motor car now that can climb any hill on earth.

Millionaire—That's nothing; the last one you sold me tried to climb a tree.

PLENTY OF EXERCISE.

Medical Friend—"Now that you have a car you must not neglect your exercise."

"Oh, no, we won't, doctor," was the reply, "you see this is a second-hand car."

UNTOLD WEALTH.

John—Is he rich?

Jack—Rich! Why, man, he owns a motor car, a ton of coal, a dozen eggs and a pound of butter.

THE AFFABLE TRAFFIC COP.

"Yes of course, it's all a nuisance. Traffic rules are pests, I know; I'd be glad, if I were Captain, Just to wink and let you go. But I'm not—I'm just a hireling With my weary rounds to trudge. It's all right with me—but, brother—Better go and see the Judge."

"How's that, madam? Ain't it awful? You just drove your car down town, Then dropped in to buy a bonnet And a simple little gown? In the store just twenty minutes? Ain't time awful in its flight? See the Judge tomorrow morning; Nice young fellow—he's all right."

"O, your watch stopped? Ain't that madd'n'ing?"

Mine stopped, too, the other day, Nearly made me late to roll call; Guess I'll give the thing away. Tell the Judge just how it happened; Judge is nice—he'll understand. Tell him you were three hours over—Blame it on the minute hand."

"Wife forgot to telephone you Where she'd parked the car?—well, say, Ain't that like forgetful women?"

Don't they do things just that way?

Well, let's see, how can we fix it?

Say, I'll tell you what to do—

See the Judge tomorrow morning;

He won't do a thing to you."

—William Herschell in Indianapolis News.

DIDN'T TAKE.

Two neighbors were discussing their various family ailments during an afternoon call. "Did you ever try auto-suggestion?" one asked the other.

"Often," was the reply, "but I can't induce my husband to buy one."

HER PREFERENCE.

She—"I think that driving is ever so much jollier than motoring."

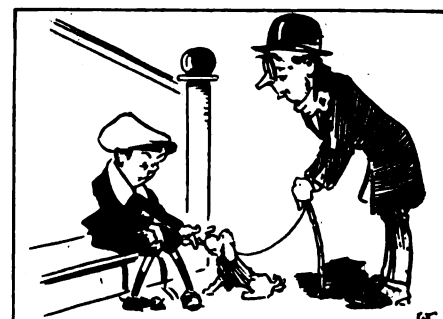
He—"Why?"

She—"Why, in motoring you have to use both hands to steer."

DIDN'T WANT TO BE PARKED.

A small boy sat on a door step looking extremely doleful. "What's the trouble, my little man?" asked a sympathetic passer-by, "have you lost your mother?"

"No," sighed the boy, "she's not lost. But I got to wait for her an' I don't want to be parked here all night."



The New Porter Represents the Highest Ideals of Designer

THE Morton W. Smith Co., Inc., 19 West 44th street, New York, is the sole distributor of the Porter motor car, which was designed by Finley Robertson Porter and is manufactured by the American British Manufacturing Corporation, with plants at Providence, R. I., and Bridgeport, Conn.

In 1914 Mr. Porter was engaged in the production of a car of a high grade known as the F. R. Porter motor car, when the war stopped production after only a limited number had been made. These cars, however, after running three or four years, successfully met the designer's test for an ideal car—an American car for American roads, supplying the motorist with an automobile of high grade foreign type, but eliminating complicated construction, excessive weight and consequent high cost of operation. This ideal is now offered in the Porter motor car, which is stated to combine efficiency and economy, and to include every factor making for comfort, safety and power.

It is offered in the following models: Limousine, closed bodies designed by Brewster & Co., \$11,200; full collapsible landaulet, \$11,300; large enclosed drive limousine, \$11,200; small enclosed drive limousine, \$11,000; seven-passenger touring car, body built by Blue Ribbon Body Co., \$9,400; four-passenger touring car, body built by Fleetwood Body Co., \$9,200; chassis, \$6,750. All prices include war tax.

Following are the specifications of the Porter chassis:

Engine—Porter design, four-cylinder, 4.6-inch bore, 6½-inch stroke; three-point suspension; crankcase of aluminum alloy; crankshaft, three-bearing, 50 C. chrome-vanadium steel, double heat treated and finished all over. Shaft is counterbalanced; all bearing pins are 2½ inches in diameter; bearings are bronze shells lined with Fahrig metal. Overhead valves, four per cylinder, operated through rocker arms by one camshaft; both inlet and exhaust valves, 1 13/16 inches in diameter; horsepower developed at 2600 revolutions a minute, 140. Crankshaft thrust is taken on a special ball thrust bearing; cylinders cast en bloc with separate head, gas tight joint made by copper asbestos gasket. Special positive air pump is attached to rear of camshaft; camshaft driven by worm gears from vertical shaft down the front of motor which in turn is driven by worm gear and pinion from crankshaft. Pump, magneto and generator are driven by worm gears from vertical shaft; vertical shaft and camshaft mounted on ball bearings. Westinghouse starting and lighting system; cooling by a large centrifugal water pump.

Ignition—Berling two-spark independent; two spark plugs a cylinder.

Oiling System—Pressure and splash combined. The oil is drawn by a positive pump from the sump and is forced under pressure by individual leads to each main bearing and by a separate lead

to the camshaft, entering the camshaft housing at the rear, then flowing to the front of camshaft housing and down the vertical shaft housing back to sump. Oil to main bearings is thrown out through the bearings, where it is caught by a scoop and forced into the connecting rod big ends; from there it is thrown out on to the cylinder wall; it then falls back into the oil trough; scoop on the big end of connecting rod then catches it and forces part of the oil into connecting rod bearing again and the rest is forced back into the sump.

Clutch—Multiple dry disc with non-burning composition on disc; mounted on ball bearings.

Transmission—Porter design, four speeds forward and one reverse; three-point suspension; drive taken through two universal joints; tire pump and speedometer mounted on constant shaft gear and brake drum respectively.

Brakes—Cast iron to steel on both emergency and service sets; service set is on transmission and emergency on rear axle; both sets air cooled by fins around outside of drums; both sets expanding; rear brakes, extra large.

Rear Axle—Full-floating type, straight bevel gears, mounted on ball bearings throughout; torque is taken by one large torque tube on left side of propeller shaft.

Front Axle—I beam section of 50 C. chrome-vanadium steel, double heat treated ball bearings throughout.

Frame—Porter design, chrome-vanadium steel, heat treated, with tubular members for supporting brake, clutch and transmission mechanism.

Springs—Front, semi-elliptic; rear, semi-elliptic. Hartford shock absorbers both front and rear.

Steering—Porter design, worm and sector type; all shafts and gears of chrome-nickel steel, heat treated and adjustable for play in any direction.

Carburetor—Zenith, 2½-inch fixed jet type.

Radiator—Porter design, square tube with silver mountings, mounted on flexi-

ble trunnions.

Wheels—34 by four-inch artillery with 35 by five-inch United States Royal cord tires.

Wheelbase—142 inch; track, 56 inch.

Battery—Prest-O-Lite, 12 volts.

Gasoline Tank Capacity—28 gallons.

Instruments—Speedometer, clock, oil gauge, air gauge, aero type motometer, ammeter, switches for lights, magneto and starting.

Weight—2700 pounds.

NET EARNINGS OF PIERCE-ARROW OVER \$3,000,000.

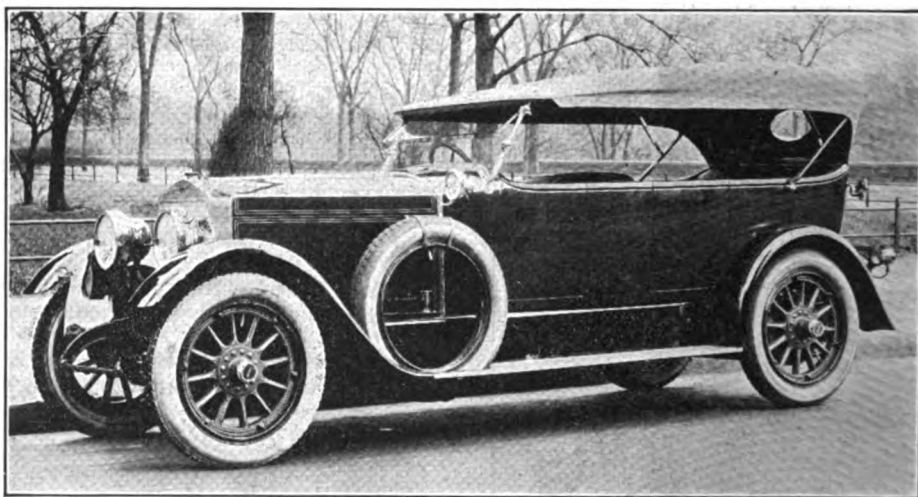
The report of the Pierce-Arrow Motor Co., Buffalo, N. Y., for 1919 shows net profits, after the deductions of charges and federal taxes, of \$2,491,070. After the deduction of preferred dividends this was equal to \$6.75 a share earned on the 250,000 shares of capital stock of no par value. Last year \$7.86 a share was earned. Net earnings are reported at \$3,161,122, as compared with \$4,273,172 in 1918, but attention is called to the fact that allowances of \$501,326 for depreciation of properties had been made before net was set down.

The balance sheet of the company as of Dec. 31, 1919, shows property account at \$5,523,808, as compared with \$4,874,351 in 1918, and inventories decreased to \$13,545,422 from \$14,582,351. The cash item decreased to \$1,424,163 from \$2,333,695. Bank loans were cut to \$2,000,000 from \$3,837,500 and accrued war taxes were shown at \$600,000, as compared with \$1,200,000 in the preceding year.

LEE RUBBER & TIRE CORPORATION.

The Lee Tire & Rubber Co., Conshohocken, Pa., reports net profits for the year 1919, after reserves for income and excess profit taxes, were \$471,805, compared with \$200,348 in the previous year, the earnings for the year, after taxes, being equivalent to \$4.71 on each share of capital stock outstanding.

A recent report of the Pennsylvania State Agricultural Department shows that 2419 farm tractors are in operation on the farms in that state.



New Porter Car, Manufactured by American British Corporation and Distributed by Morton W. Smith Co., New York.

Personal News of Industry and Trade

Wilcox Becomes Research Engineer

Howard Wilcox, the famous automobile racing expert, has been appointed research engineer of Cole Motor Car Co., Indianapolis, Ind. Mr. Wilcox brings with him to this new position an experience in the automobile industry extending over a long period of years, his first connection being with the National Motor Vehicle Co., from 1904 to 1909, during which time he became associated with almost every branch of work conducted in that plant. He has the distinction of being one of the men directly responsible for the development of the first National racing cars and was a member of the first National racing team whose signal victories will be long remembered. In 1912 he entered the taxicab business but, at the same time, kept up his inter-



Howard Wilcox, Well Known Racing Driver, Becomes Cole Research Engineer.

in the 500-mile race at Indianapolis, having as team mates Jules Goux and Andre Boillot, the two leading French drivers. The appointment of Mr. Wilcox will be followed by an expansion in the production of Cole cars.

Gordon H. Gannett and L. S. Wiggin are in charge of the eastern sales office just opened by the Timken-Detroit Axle Co. in the Post-Standard building, Syracuse, N. Y. After May 3 the address of the Chicago sales office of the Timken-Detroit Axle Co. will be 1403-1405 Conway building.

Charles E. Stuart, who has recently been appointed by Vice President Hal T. Boulden as assistant sales manager of the Selden Truck Corporation, Rochester, N. Y., has had a ripe experience in the motor vehicle trade as salesman, dealer and field sales manager.



Charles E. Stuart, Assistant Sales Manager, Selden Truck Corp.

Beall Accepts Gray Corp. Presidency

F. F. Beall has accepted the presidency of the Gray Motor Corporation, a newly organized concern, to take over the plant, equipment and business of the Gray Motor Co., Detroit, builder of the Victory motor, and associated with him are a number of prominent Detroit automobile men, including William H. Blackburn, formerly production manager of the Cadillac Motor Car Co., who is to be factory manager of the new Gray organization. Mr. Beall has, for the last seven years, been vice president in charge of manufacturing of the Packard Motor Car Co. The Gray Motor Corporation is capitalized at \$4,000,000 and a production of 30,000 cars annually is planned.

L. M. Baker has resigned as supervisor of sales of the motor equipment division



L. M. Baker Represents Dittmer Gear & Manufacturing Co. in Michigan.

of the Hyatt Roller Bearing Co. to take over the exclusive representation in the State of Michigan of the Dittmer Gear & Manufacturing Co., Lockport, N. Y. Mr. Baker was formerly associated with the Bearings Service Co. as well as being sales manager of the United Motors Service, Inc. Previous to that connection he was with the Dittmer Co., to which he now returns. He will also be associated with his brother, E. K. Baker, in the wheel and rim business. His headquarters will be in Detroit.

B. A. Lyman, who has been for nine years with Maxwell Motor and Chalmers interests, has been promoted to the position of sales director. Although a young man, Mr. Lyman brings to his new office mature judgment and a thorough understanding of every dealer's problem, obtained by hard experience and schooling under acknowledged expert manufacturing merchandisers.



B. A. Lyman, Director of Sales of Maxwell-Chalmers Interests.

est in racing and participated in many events on the speedways of the country. In 1913 he helped design and drove a special racing car which won honors under the name of the "Gray Fox." In 1915 Mr. Wilcox was a member of the famous Stutz racing team and in 1916 and 1919 drove the noted French Peugeots, winning the 500-mile race at the Indianapolis motor speedway with one of these cars last year. Mr. Wilcox was also recently associated with the Allison Experimental Co. at Indianapolis, specializing on tool and jig work. The Allison experimental laboratory was a government research station and it was there that the first Liberty motor was built, as well as the first United States tractor motor and the first successful reduction gear to reduce the ratio of aeroplane propellers from the air-whipping stage to that of maximum efficiency was developed there, and Mr. Wilcox was actively associated in all this work. This year he has been retained to represent the Peugeot factory

Ellis with Jenkins Vulcan Spring

A. L. Ellis is the new production manager of the Jenkins Vulcan Spring Co., Richmond, Ind. He was formerly with the spring division of the Detroit Steel Products Co., and his experience in the production of leaf springs extends over a period of 20 years. Mr. Ellis will have full charge of production to meet the demand of more than 8000 Vulcan dealers in all parts of the United States and Canada.

J. F. Hernberg is in charge of the truck department of the Paige-Detroit Co. of New England, with headquarters in Boston. Mr. Hernberg is a native of the great west and brought a large amount of characteristic optimism with him in assuming his activities in the eastern field. The Paige truck is built in 1½, 2½ and 3½-ton capacities, but Mr. Hernberg states that it is the 1½-ton size that is making the greatest ap-



J. F. Hernberg, Manager Truck Department, Paige-Detroit Co. of New England.

peal to the New England trade, as this is especially designed with several styles of bodies for the farmer and truck gardener, as well as for light delivery.

Charles P. Hammond, treasurer of the Hammond, Hebard Automobile Co., Lynn, Mass., recently died at his home in Swampscott, aged 33 years. He attended the Massachusetts Agricultural college and later the University of Michigan. He also took a special course in forestry at the University of Maine and during the war was employed in the forestry department of the United States government. He is survived by a wife, son and two brothers.

Messrs. Allen and Welshafer have organized the Allen-Welshafer Motor Corporation, which has opened headquarters at 1593-1595 Main street, Buffalo, N. Y., for the sale of used cars. They also operate a store at 1598 Main street for the sale of automobile accessories, including the Pressure Proof piston ring.

Fred J. Peterson has been appointed distributor of Jordan cars in Philadelphia.



A. L. Ellis, New Production Manager, Jenkins Vulcan Spring Co.

H. W. Usherwood has been appointed assistant to Harry S. Daniels, advertising manager of the Dort Motor Car Co. Mr. Usherwood was a first lieutenant in the American Expeditionary Force and was in charge of the office that printed the peace treaty in Paris.

H. L. McClaren, president of the McClaren Rubber Co., Charlotte, N. C., has been appointed a member of the board of 15 to look into the disposition of the United States merchant marine.

Martin Kolbenstetter, organizer of the Kol-Ben Wheel Co., Cadillac, Mich., has resigned from that concern and is said to be planning the formation of a company to manufacture wire wheels and equipment.

M. A. De Souza has been appointed Washington branch manager of the Goodyear Tire & Rubber Co., succeeding E. F. Shutz who has been promoted to the district office in Washington.

Charles E. Roney has been made sales manager of the Starkweather Co., distributors of Aircraft tops in Michigan and the northern part of Ohio and Indiana. Mounting stations have been established in more than a dozen cities.



Major A. G. Stevens, Head of Highway Transport Division Goodrich Travel Bureau.

Stevens Heads Goodrich Highway

Major A. G. Stevens, highway transportation expert of the Council of National Defense, has been made head of the highway transport division of the Goodrich Travel and Transport Bureau, Akron, O., of which Raymond Beck is chief. Before entering government service when the United States entered the war, Major Stevens was engaged in railroad tariff compilation, in which work he was considered an authority. Because of his experience he was placed in charge of the section of the finance division of the War Department which issued railroad freight charges. Amounts handled by his department often totalled \$30,000,000 a month. After the war Major Stevens was assigned to the Council of National Defense to make a comprehensive survey of highway transportation throughout the country. He compiled data showing the comparison between railway, waterway



Harry O. Foskett, Sales Manager Merchants' Motors, Inc., New England Distributor of Acacon Trucks.

and highway rates, obtained reports from all agencies interested in motor express development, and gathered accurate figures on operating costs in various sections. In his present work Major Stevens will correlate all available information on highway transportation, make analysis of engineering features of motor trucking and issue bulletins containing a digest of all matters of interest.

Harry S. Foskett is sales manager of Merchants Motors, Inc., 584 Commonwealth avenue, Boston, distributor for eastern Massachusetts of the Acacon truck built by the Acacon Motor Truck Co., Detroit, Mich. He is a native of Jackson, Mich., and has a fine record for salesmanship in the commercial motor vehicle field. He is proving an efficient assistant in the sales department to President Charles S. Davis of Merchants Motors, Inc.

J. Ryan, dealer in auto supplies, Easton, Pa., has moved to North Main street.

Torbensen Axle Co's Executives

The association of three new executives in the production division of the Torbensen Axle Co., Cleveland, O., is announced by Vice President Robert Ehos, which is expected to considerably strengthen the manufacturing organization of the company.

These are J. D. Smith, as manufacturing manager, who was formerly with the Timken Detroit Axle Co., as works manager; G. W. Veale, formerly production supervisor for the Timken-Detroit company, to be production superintendent, and G. W. Carlson, engineer, formerly with the Timken company, who will serve in the same capacity.

All have served in the axle industry for years and have become known for their capacity in their several specialties, and their united endeavors will no doubt materially promote the activities of the Torbensen plant.



H. E. Quinlivan, New York and New England States Manager Bailey-Drake Co.

Linscott Well Known in Supply Trade

One of the best known automotive supply houses in the New England field is the Linscott Supply Co., of which F. C. Linscott is president and manager. This concern is located at 568 Commonwealth avenue, Boston, and has, during the past year, installed a separate department for the better accommodation of its rapidly increasing business.

Mr. Linscott has been associated with the automotive industry at the Hub for many years, and under his efficient management the Linscott Supply Co. has greatly augmented a merited patronage founded on integrity, fair dealing and good will.

Among the well known equipment recently taken on by this concern, and with the distributors of which it is meeting with unqualified success, is the Universal cylinder reboring tool for any motor, as



J. D. Smith, Manufacturing Manager, Torbensen Axle Co.



G. W. Veale, Production Superintendent, Torbensen Axle Co.



G. W. Carlson, Engineer, Torbensen Axle Co.

QUINLIVAN WITH BAILEY-DRAKE CO.

H. E. Quinlivan, formerly with the Splittdorf Electrical Co., is the new New York and New England states representative of the Bailey-Drake Co., Chicago, Ill., the well known distributor of automotive products. Mr. Quinlivan has had a successful experience in connection with the sale of electrical and general automotive accessories and his new appointment gives him a broad field of representation for the standard products distributed by the Bailey-Drake Co. This concern was established in San Francisco in 1908, but its rapid growth rendered necessary a general headquarters more centrally located, so these were established at Chicago. Its activities now cover the entire United States and Canada, and large branches have been established in New York City, Detroit, Atlanta, Ga.; Dallas, Tex.; Kansas City, Mo.; Minneapolis, Minn.; Seattle, Wash., and San Francisco.



F. C. Linscott, Linscott Supply Co.

well as special equipment for babbitting and boring the cylinders of the Ford model T car and Fordson tractor, manufactured by the Fordson Tool Co., Inc., 435 Woodward avenue, Detroit, Mich., maker of other well known Utco products.

BUDA CO. CREATES NEW OFFICE.

Realizing and appreciating the necessity and importance of efficient and prompt service for the disbursement of spare parts, the Buda Co., Harvey, Ill., recently appointed R. A. Kiken to the new office of service manager of the engine division.

Mr. Kiken's experience in this field dates back to February, 1910, when he first entered the employ of the Buda Co., since which time he has served in practically every branch of the factory, including the stores, cost, production, efficiency and sales departments. He served two years overseas with U. S. army.

FARM-TO-CONSUMER SALES BY PARCEL POST



1, Mailing a Case of Eggs from First Rural Schoolhouse Postal Station in the United States, Two Taverns Mount, Jay Township, Pa. 2, Postal Truck Arriving at First City School Station in the United States, Park View Community Centre, Washington, D. C., with Load of Farm Products; 3, A Postal Truck Collecting a Parcel Post Package at a Farm; 4, the Old and the New Way of Hauling Parcel Post Packages; 5, Taking on a Freight of Baskets of Fruit at a Country Store Station.

Weston Electrical Fault Finder

The Weston Electrical Instrument Co., Newark, N. J., is presenting to the garage and repair shop trade its Weston Model 441 Fault Finder. This consists of a voltmeter and ammeter, two independent instruments, mounted in a compact case with a carrying handle and hinged cover. In this all binding posts have been eliminated, connection between the apparatus being tested and the instrument being made by means of flexible rubber covered cables having plugs on one end which fit into receptacles in the instrument and spring clips on the other end. The voltmeter has ranges of .2-0.3 and 2-0.3 volts. With these ranges tests can be made to determine the voltage of the storage battery as a unit or of the individual cells; the cadmium test can be performed; open, shorts and grounds can be located; the generator voltage, as well as the voltage at any light or the horn, etc., can be measured; ignition condensers can be tested for opens and grounds and many other tests for troubles can be made.

The ammeter has a range of 30-0-30 amperes, which permits the rate of charge or discharge to be determined. It is also used in adjusting the relay, for locating shorts in the branch circuits, etc. The ammeter is protected against burn-out by an automobile type glass enclosed fuse which is accessible for replacement.

A very comprehensive and complete instruction book accompanies each instrument.

The Vulcan Implement Co., Evansville, Ind., has established a northwestern branch at Minneapolis, Minn., in charge of Harry Simpkins.

EXPANSION PROGRAMME OF HERCULES MOTOR CO.

The Hercules Motor Manufacturing Co., Canton, O., has increased its capital from \$800,000 to \$1,500,000, all common stock, to permit the carrying out of plans for greatly increased production. The following officers were elected: President, J. C. Obermier; vice president, Gordon M. Mather; secretary, treasurer and general manager, Charles Belough; H. H. Timken, chairman board of directors; other directors, Rathburn Fuller, R. W. Gallagher, Austin Lynch.

A separate company, known as the Motor Castings Co., has recently been formed to furnish castings for Hercules engines.

MCCORD GASKET POSTER.

The McCord Manufacturing Co., Detroit, Mich., has just issued an effective piece of publicity which is rather unique. It consists of an attractive poster showing the various types of copper-asbestos cylinder head gaskets used on all American passenger cars, motor trucks and tractors, reproduced in the natural copper color. A total of 89 different gaskets are shown, used on 140 passenger cars of different models, 47 motor trucks, 31 tractors and three miscellaneous motors. An alphabetical list of cars, trucks and tractors is included, giving the numbers of McCord gaskets, which are built to the specifications on the manufacturers' blue prints for these particular motors.

The McCord company will be pleased to forward these posters to any service station or dealer.

N. W. Cooper of Los Angeles, Cal., recently purchased his 19th automobile. Total mileage covered is 201,000 miles.

Unique Drive Started by Rochester Club

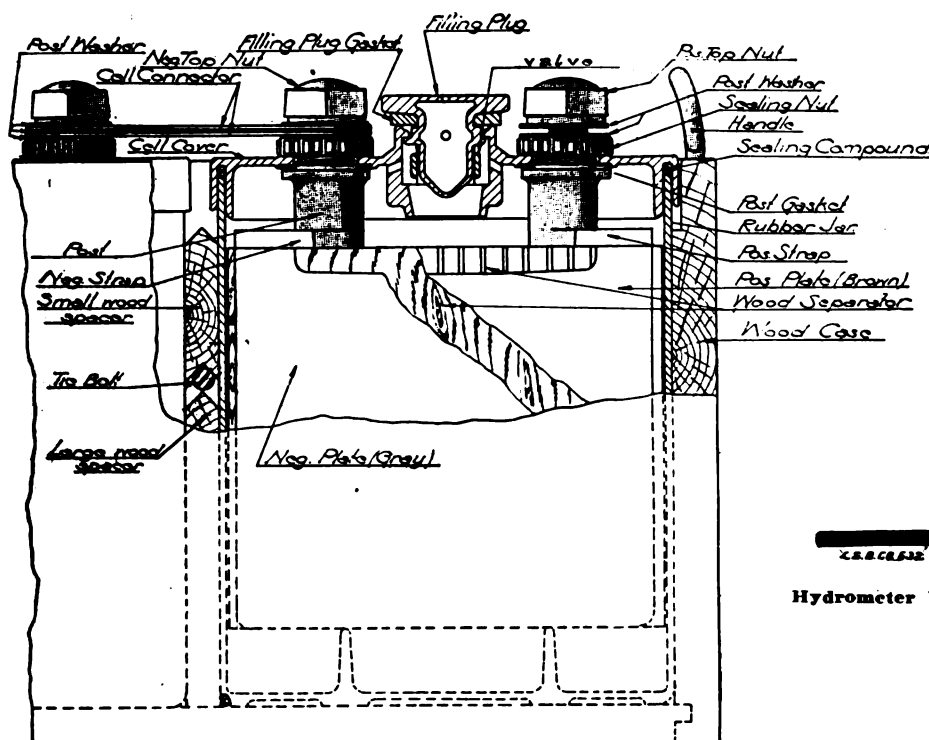
The Automobile club of Rochester, N. Y., is carrying on a unique new membership campaign in the way of a road race on canvas—from that city to San Francisco, Cal. Every make of car that is sold in Rochester is represented, some 42 in number. Each car has a captain and five drivers, and on a large canvas drawing, 22 by eight feet, that holds a prominent position in the lobby of the Powers hotel, is shown in miniature the road from Rochester to San Francisco. Along this road is a long line of tiny automobiles, each bearing the name of the make of the car. The position of each car on the canvas indicates its progress.

Across the top of the canvas are marks $1\frac{1}{2}$ inches apart, which distance is equal to 13 miles on the road. Every paid membership application that is turned in by a driver advances his car 13 miles.

Much credit for this unique way of conducting a membership drive is due to Frank J. Smith, chairman of the membership committee. The judges are Mayor Edgerton, Frank J. Smith, C. D. Van Zandt, president of the club, and William W. Hibbard, president of the city common council. The publicity committee consists of George C. Donahue, secretary of the club; Donald F. Craigie, automobile editor of the Rochester Herald, and M. S. Hutchins, advertising manager for Buelte Motors, Inc., and Strong Motors, Inc.

In Canada there are 4239 automobile agents, dealers, garages and accessory shops. Of this number Ontario has 1460 and Saskatchewan is next with 712. Prince Edward Island has only 20 automobile service stations.

Care and Maintenance of the Storage Battery



Typical Storage Battery with Parts Indicated.

THE storage battery on the motor car may be considered the heart of the electrical system. Its functions may be compared to that of a storage tank or reservoir in the typical water works system of the modern small town. The reservoir corresponds to the storage battery, the pump to the generator and the water mains to the wiring of the car. When the generator produces more current than is consumed by the ignition, lamps or other electrical accessories, the surplus current passes through the battery, causing it to take on an electrical charge; that is, to store up energy, as ordinarily understood. When the engine is at a standstill and the generator is not running, or if the engine is not driving the generator fast enough to produce the required amount of current, the battery supply may be drawn upon for cranking the engine, operating the lights, supplying ignition, operating the horn, or performing any other service for which the electrical system may be designed.

The cause of most battery troubles is due to improper care of the battery and misuse of the electrical equipment, chiefly because the principles involved are not understood.

Composition of Storage Batteries.

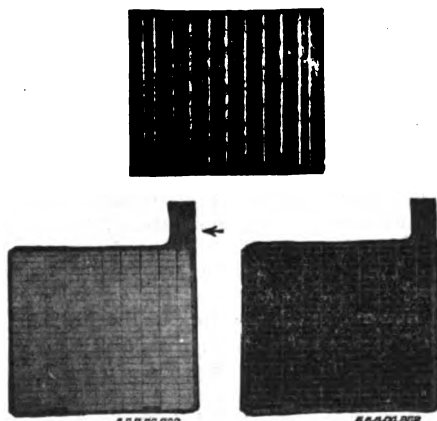
Storage batteries for automobile use are composed of rubber jars, lead plates, plate separators and electrolyte. The plates are composed of lead cast into grids, with a composition of lead oxide pasted into them. This composition is called the active material, and sets hard similar to cement when dry, remaining so throughout the life of the battery. The plates are then placed in the electrolyte and a current of electricity passed through them for a few days. This causes

a chemical action to take place, which converts the active material of the positive plates into spongy metallic lead.

As the battery is charged lead peroxide forms on the positive plates and spongy metallic lead on the negative, and as the battery is discharged lead sulphate forms on both plates.

Lead sulphate is bulky and when formed in excess or too rapidly will buckle the plates. Therefore, rapid or excessive discharging is to be avoided.

The jars are made of either rubber or glass to prevent the acid from acting upon them. A cell comprises a jar with plates and electrolyte. The voltage of a cell is about 2.2, regardless of the size or number of plates in it. A three-cell battery consists of three cells connected in series, and has a voltage of approximately 6.6. The plates do not extend to the bottom of the jar, a space being left for



At Top, Wood Separator: Note Grooves—Active Material Passes to Sediment Well in Bottom of Cell. Below, at Left, Negative Plate; at Right, Positive Plate.

sediment that will accumulate as the battery is used.

Plate separators are made of either wood or hard rubber, and are used to keep the plates of opposite polarity apart, also to prevent foreign substances from forming short circuits in the cells. The plates are placed alternately in the cells, a positive and then a negative, all of the positive plates being connected in parallel, as well as the negative. To distinguish the positive from the negative plates it is merely necessary to remember that there is one more negative plate than positive, also that the color of the positive plates is reddish brown, while that of the negative is a dark gray. The capacity of the battery, in ampere-hours, depends upon the size of the plates.



Hydrometer Used When Testing Specific Gravity of Cell.

The electrolyte is made by mixing pure sulphuric acid with water in definite proportions. The specific gravity of water is 1.000 and that of pure sulphuric acid about 1.840. If two parts of acid were mixed with five parts of water the resulting electrolyte would be about 1.300 gravity. The acid should be added to the water when the electrolyte is being made, and not the water added to the acid. The specific gravity of an electrolyte should be taken when it is cool. Pure distilled water should be used in a storage battery.

Finding the True Gravity of a Battery.

The true gravity of the solution in a storage battery can only be ascertained by charging the battery until the gravity ceases to rise for a period of at least two hours. When a battery is being charged, the gravity continues to rise until it is fully charged. As a battery is discharged its gravity falls.

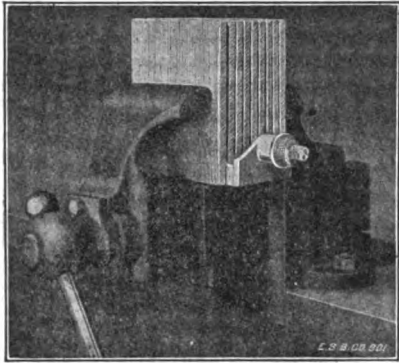
A fully discharged battery will test about 1.150. A battery should not be used when the gravity is this low, but should be charged at once. If the gravity of the battery is low, distilled water should be added until the plates are covered from $\frac{3}{8}$ to $\frac{1}{2}$ inch, and the battery given a charge from an outside source. It should be charged until the gravity ceases to rise for two hours. The reading should then be between 1.275 and 1.300.

A battery may be practically discharged and still test 1.300 if it has been "doped" (too much acid added). To determine the actual working condition, allow the battery to discharge at, say, 100 amperes and measure the voltage of each cell while discharging. If this voltage falls below 1.6 the cell is defective or nearly discharged.

Rate of Charging the Battery.

The charging rate depends upon the size of the battery and state of charge. If the gravity of a battery is below 1.150, or over 1.250, it should be charged at about five per cent. of the rated capacity.

ity; that is, a 100 ampere-hour battery should be charged at five amperes. If the gravity of the battery is between 1.150 and 1.250, it should be charged at 10 per cent. of the rated capacity, or in



Straightening Buckled Plates with Vise.

case of a 100 ampere-hour battery, under the same conditions, it should be charged at a 10-ampere rate.

Adding New Electrolyte.

Pure acid or new electrolyte should never be added when a battery is in a discharged condition. The gravity of a battery being low is not a sure sign that it needs new electrolyte, as it may be in a discharged condition. The cells should be filled to the proper height with water and the battery charged until the gravity ceases to rise for two hours. If the gravity fails to rise to 1.275, some of the solution may be taken out and replaced with new 1.300 electrolyte.

The voltage of a cell, while charging and nearing a fully charged condition, will rise to approximately 2.2 volts when charging ceases. When a storage battery is being charged energy is being stored up in it in a chemical form. This energy is returned in an electrical form when the battery is discharged. When two parts of sulphuric acid are mixed with five parts of water the gravity of the solution would be 1.240 if there were no evaporation. Enough water evaporates, however, to make the gravity of the solution 1.300 when cooled. Acid does not evaporate. Adding electrolyte to replace evaporation is wrong, for if this is done the battery may have a gravity of 1.300 when not fully charged. To make sure of the true gravity, the battery should be kept on charge until the gravity ceases to rise for two hours, and the true gravity of the battery will then be obtained.

Adding Water.

Pure, distilled water should be added to a battery when in use at least twice a month. In cold weather water should never be added to a battery and allowed to stand in a cold place, unless it has been given a charge after the water was added. Water is lighter than electrolyte and will remain on top and freeze if not mixed with the electrolyte.

Terminals of the Battery.

The terminals of a battery should be kept tight and free from corrosion. If the terminals begin to corrode the foreign matter should be removed at once. Take all bolts, nuts, washers and straps that can be removed readily and

clean them by placing in a strong solution of cooking soda and letting them stand for a half hour. Then use a short, stiff brush to remove all signs of corrosion. Also clean the terminal posts of the battery, being careful not to let the soda solution get into the battery. Wipe all parts dry and give them a good coat of vaseline. When assembling wipe the vaseline off contact surface so that good contact is made. After all parts are assembled they should receive another coat of vaseline. If the terminals are kept well coated with vaseline, corrosion will not occur. The terminals of a battery are usually marked positive (+) and negative (—).

A fully charged battery of about 1.300 specific gravity will freeze at about 90 degrees below zero, but when discharged to 1.150 will freeze at about 10 degrees below zero. A filling syringe should be used when adding water to the battery. Keep the battery and compartment clean and dry and free from foreign substances.

Sediment.

The wearing of a battery causes sediment to accumulate in the bottom of the cells, which must be removed. If the sediment is high enough to short circuit across the bottom end of the plates it will cause the battery to overheat, gas excessively, the gravity will be slow to rise and when the charging current is switched off the voltage of each cell will drop below 2.2 and will continue to drop. The gravity of the solution will also continue to fall and in time the battery will be discharged even if not in use.

To remove the sediment fill each cell with pure distilled water to the proper height and place the battery on charge until the gravity of all the cells ceases to rise for two hours. Remove the plates, set them in an earthen vessel and cover with water. Clean the sediment out of the cells and wipe them dry. Fill the cells about one-fourth full of 1.300 electrolyte. Then set the plates in the cells, and immediately cover with new 1.300 electrolyte. Be careful not to have plates exposed to the air for any length of time. Discharge plates back to a point where gravity tests 1.200. Then charge until the gravity of all the cells ceases to rise for two hours. All battery cells should be ventilated to allow the gas which is given off while charging a chance to escape.

Use a good hydrometer for taking the gravity readings and care should be taken to purchase the best possible, as some cheap hydrometers are on the market that have been proven inaccurate.

Sulphation.

A sulphated battery should be charged at a very low rate, if the gravity is very low. The charge should be continued for four or five hours after the gravity has ceased to rise. A battery that is out of service should have pure distilled water added and receive a charge at least once every two months.

Batteries are rated in ampere-hours; that is, a 100 ampere-hour battery will supply current for approximately 100 hours at the

rate of one ampere, or for 50 hours at a two-ampere rate, etc. Tests prove that most storage batteries fall below their rated capacity, and as the discharge rate is increased the actual capacity decreases.

Direct current must be used for charging batteries. If only alternating current is available it must be rectified. A vibrating rectifier, rotary converter, or an alternating current motor driving a direct current generator may be used. The positive and negative charging wires, or battery terminals, can be distinguished as follows: Dip the ends of the wires in salt water, keeping the ends about an inch apart. Bubbles will rise from the negative wire. The wires should be connected to the battery so that the positive charging wire is in contact with the positive terminal, and the negative charging wire with the negative terminal. The difference between alternating current and direct current can be told by dipping the wires in salt water. If alternating current bubbles will arise from both wires, while in the case of direct current, only from the negative.

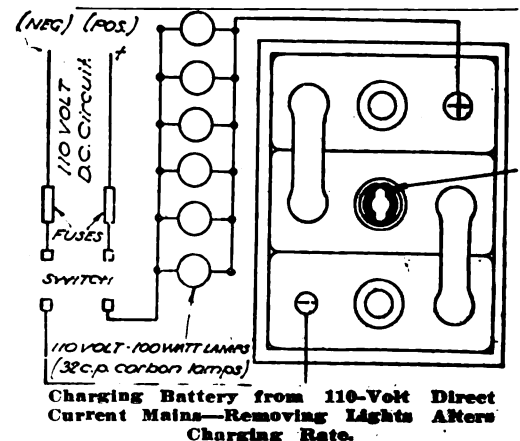
The user of a battery should keep the top of cells dry and free from foreign substances, keep it charged, keep plates covered by adding pure distilled water at intervals, and see that the terminals do not corrode.

The illustration shows connection for charging a battery from a 110 volt direct current line, using a bank of lamps. The charging rate is increased by cutting in more lamps and decreased by taking out.

PERIODIC INSPECTION.

Most automobile owners have been educated up to the point of recognizing the economy of sending their cars to a good service station for thorough inspection, greasing and oiling after each 1000 miles or so of driving. Many others who have a natural bent for things mechanical learn to do this important work themselves.

In addition to this periodic treatment, however, a car should be gone over weekly. Grease and oil cups should be filled with proper lubricants. A little careful study of the instruction book, together with a bit of energy, will unquestionably be amply repaid by the prolonged life of the car, to say nothing of increased satisfactory performance.



Home-Made Aluminum Rectifier Which Obviates Battery Charging Troubles

IT IS doubtless the case that many more owners of automobiles would equip their cars with storage batteries for lighting purposes if it were not for the expense and trouble necessary in taking the battery out of the car and having it recharged at the service station. This is particularly true of Ford cars not provided with a storage battery for lighting, and the following method of making a device that may be used in the cellar of the house, or garage, will help solve this trouble for many owners.

Of the many components on the market for recharging batteries, there may be mentioned the magnetic rectifier, the mercury arc and the motor generator. The cost of any one of these outfits is prohibitive to many motorists when the service rendered is considered. The lowest priced outfit would probably cost \$35, while the motor generator set would be in excess of \$100.

supplied with a binding post at the top to which the connecting wires may be attached.

There may be a tendency for the liquid in the jars to get warm and it may become even hot enough to boil. Trouble of this kind can be prevented by having the four jars set in a vat of water so arranged that cold water may enter slowly and the warm be carried away. A wooden box lined with galvanized iron or painted with a water proof paint would serve the purpose nicely. If the current taken from the rectifier is not excessive this cooling vat may not be needed at all.

To Set Up the Rectifier.

To set up the rectifier, place the four jars in rectangular form as near each other as convenient. Place two of the aluminum plates towards the outside of each of two jars and connect by wire; call this wire "A" as shown in the illus-

thing that can be used. They should be connected in parallel and not in series, as shown, thus enabling the variance of the strength of the direct current by screwing the globes either in or out of the sockets. The number of lamps used will depend upon the capacity of the battery that is being charged. From four to six should be enough for a storage battery of 10 ampere-hour capacity. One can figure that a half ampere will pass through each 16 candlepower lamp that is screwed into the socket, so that when four lights are burning, two amperes will be passing.

At Beginning of Charge.

In the beginning of the charge let all the lights be used for two or three hours, then later one globe may be screwed out of the socket, and so on until on the last hour of the charge perhaps one light will be enough. In general, storage batteries should be charged more rapidly for the first hours than later. If the rectifier is kept cool the battery may be charged at night and thus require but little of the motorist's time and the battery will always be ready for service on the car. There should be a switch in the alternating current circuit to cut off the rectifier, when not in use.

Rectifiers of this type are not of very high efficiency, that is, more current goes in on the alternating side than can possibly be taken from the direct side, but even then the cost of charging at home, if it is rightly done, will be less than the price paid at a service station, to say nothing of the convenience afforded by always having the battery ready for service.

Cost of Apparatus.

When it is seen that the total cost of this apparatus is less than \$5, even if all parts have to be bought new, it appears that it will yield a big interest on the investment.

It should be noted that the wire which leads from the two aluminum plates that are connected, is the positive wire on the direct current side and should be connected to the pole of the storage battery marked "X." It is also important that pure aluminum be used for the plates. Some on the market is too impure for good results. The aluminum plates should be at least 1/16 of an inch thick and it might be advisable to have them heavier.

This home rectifying device for charging storage batteries is designed to give satisfaction on a 110-volt alternating current circuit.

SOLDERING OF ALUMINUM BRONZE.

To solder aluminum bronze with ordinary (pewter) solder, thoroughly cleanse from dirt and grease the parts to be joined. Then put the parts to be soldered in a strong solution of sulphate of copper and place in the bath a rod of soft iron touching the parts to be joined. After a while a copper like surface will be seen on the metal. Remove from bath, rinse clean and brighten the surface. These surfaces can then be tinned by using a fluid consisting of zinc dissolved in hydrochloric acid in the ordinary way with common soft solder.

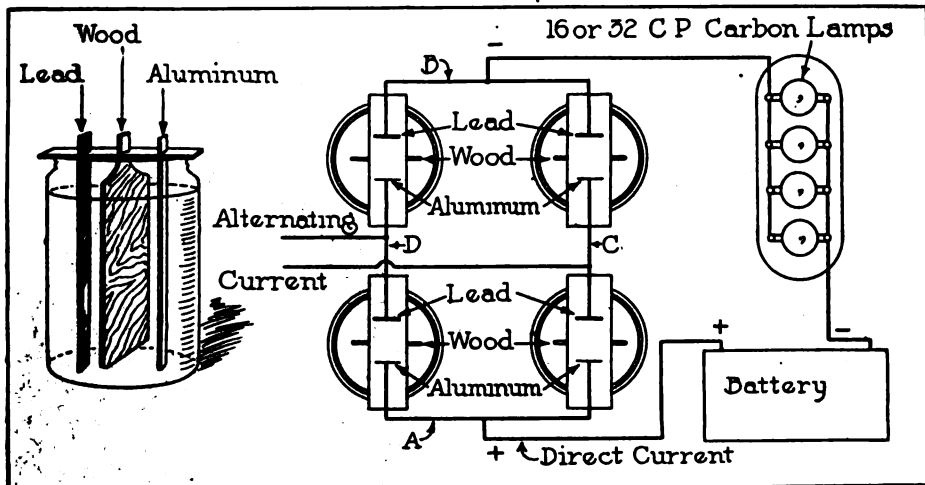
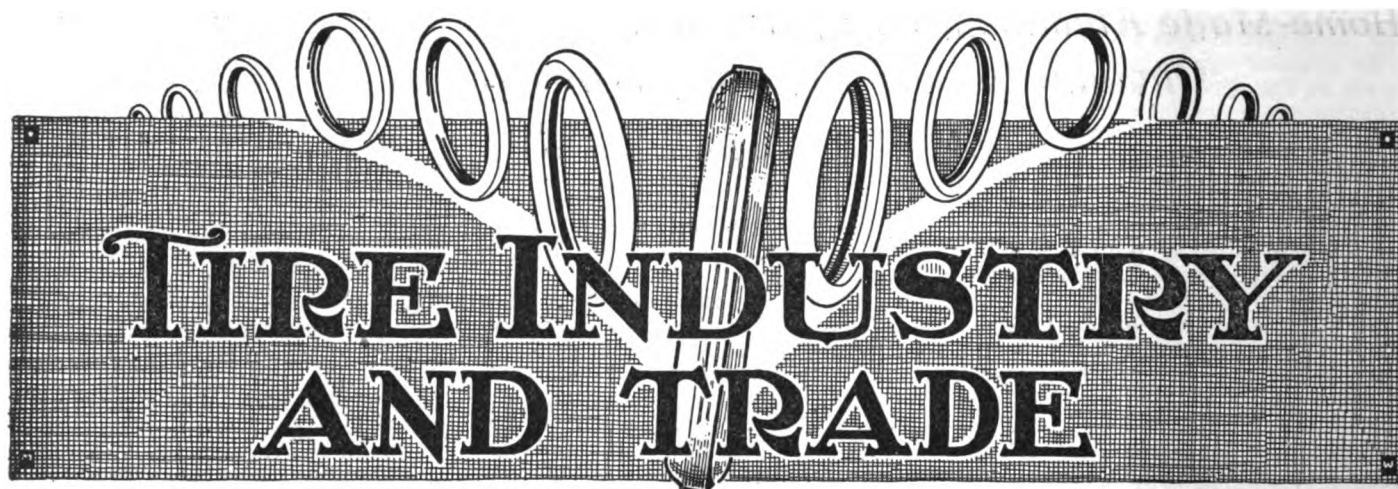


Diagram of Home Made Aluminum Rectifier and Jar Container.

The aluminum rectifier, which may be made and used at home, would not cost near these figures, and its operating expense would be very small compared to the cost of having a battery recharged at a station. Rectifiers of this type have been made and used in various parts of the country with good results. The materials needed are four jars made of glass or other insoluble non-conducting material, six inches in diameter by 10 inches high, costing probably about \$1. Quart Mason fruit jars would be all right and would cost less. Four strips of aluminum, about 1½ inches wide and as long as the jars, are needed, and also four lead or carbon strips as wide as will conveniently go into the jars and of the same length as the jar. A strip of wood or some other non-conducting material is placed between the plates at the top of each jar to prevent the aluminum plates from coming in contact with the lead or carbon plates. One aluminum and one lead or carbon plate is used in each jar and should be an inch or two apart. The jars are then filled nearly to the top with a concentrated solution of common baking soda in pure water, although it need not be distilled water. Each plate is

tration. Place two of the lead or carbon plates towards the outside of each of the two remaining jars and connect by wire, as at "B." Connect the remaining lead plates, which should be toward the inner edges of each of the two jars, by wires across to the remaining aluminum plates, which are toward the inside of the other two jars. Call one of these wires "C" and the other "D." Attach a wire to the center of "A" and another to the center of "D." These two wires form the circuit taken by the direct current from the rectifier to the lamp bank and storage battery. Connect the alternating lighting circuit wires at "C" and "D," providing a switch in this circuit so that the lighting circuit may be shut off when the rectifier is not in use.

As the voltage of the alternating current used will probably be 110, in most cases it will be necessary to introduce resistance in one of the circuits. It may be better to provide this in the charging circuit as shown, but it might be used in the alternating circuit as well. Sixteen or 32 candlepower electric incandescent carbon globes are about as cheap and convenient for this resistance as any-



TIRE INDUSTRY AND TRADE

STUDEBAKER BECOMES FIRESTONE DISTRICT SALES MANAGER.

The Firestone Tire & Rubber Co., Akron, O., has appointed C. D. Studebaker as district sales manager for the territory, including branches at Cleveland, Akron and Youngstown, O., Erie and Pittsburgh, Pa., and Buffalo, Rochester and Syracuse, N. Y. Mr. Studebaker has been with the Firestone Co. about seven years, starting as a salesman in the New York branch in 1913. One year later he



J. N. Gunn, President of United States Tire Co., Elected Director Lincoln Highway Association.

became office manager and in 1916 branch manager. In 1918 he was made district manager of the New York territory, comprising the New York, Brooklyn, Newark and Albany city branches.

HAYWARD TREASURER OF LION CO.

Charles Hayward has been elected treasurer of the Lion Tire & Rubber Corporation, Lafayette, Ind., which company is increasing its production facilities in order to meet the demand that has been created for its guaranteed tires and tubes. It is stated that the capital of this company has been increased to \$750,000.

Gunn Elected to Highway Board

At the recent annual meeting of the board of directors of the Lincoln Highway Association, J. N. Gunn, president of the United States Tire Co., was elected a director. Mr. Gunn was a founder of the association and has long been greatly interested in the work of the organization and his election to the board greatly strengthens its influence and broadens the scope of its activities.

Through the recommendations of Mr. Gunn and C. B. Seger of the United States Co., of which the United States Tire Co. is a subsidiary, that concern is planning to make a substantial contribution to the Lincoln Highway Association to carry out some additional plans which will be announced shortly.

HANKINSON TOURING PACIFIC COAST.

H. B. Hankinson, who was recently appointed assistant sales manager of the India Tire & Rubber Co., Akron, O., has been making a tour of the Pacific coast as a general representative of India interests in the West. Mr. Hankinson is well and favorably known in this section from his former connection with the Diamond Rubber Co. as manager of the Seattle, Wash., branch, and also as salesman in the Los Angeles and Portland, Ore., territory.

It is reported that the India Tire & Rubber Co. will more than double its production capacity during 1920.

AGENTS FOR OLDFIELD TIRES.

The Oldfield Tire Co., Cleveland, O., has recently secured new agencies at the following places in Pennsylvania:

Scranton, Conrad Motor Car Co.; B. F. Laudig and Electric City Sales Co.; Olyphant, H. B. Shennen; Honesdale, Thomas F. Gallagher; Wavmart, W. I. Cramer; Gravity, W. J. Bone & Son; Cardondale, Fowler & Williams; Moosic, F. C. Atherholt; Montrose, Glenn L. Vose; Hopbottom, M. T. Ryerson; Hartford, F. O. Miller.

McClaren Rubber Co., Charlotte, N. C., has put in a chemical testing laboratory.

GOODYEAR TIRE & RUBBER CO. APPOINTMENTS ANNOUNCED.

The Goodyear Tire & Rubber Co., Akron, O., has made the following promotions: I. R. Bailey, manager of the mechanical goods department, to become assistant sales manager; D. R. Burr, formerly assistant manager of the mechanical goods department, to become manager of that department, and Mr. Burr is succeeded in turn by C. A. Jones, who has been manager of the hose, railroad



I. R. Bailey, Assistant Sales Manager, Goodyear Tire & Rubber Co.

supplies and rubber band departments of the mechanical goods division.

Mr. Burr has been with the Goodyear Co. since 1913, when he was assistant manager of the mechanical goods department of the Chicago district. In June, 1916, he was transferred to Akron and was made Mr. Bailey's assistant.

Mr. Jones was born and educated in Akron, joining the Goodyear forces eight years ago. Prior to that he was with other rubber concerns engaged in estimating costs on rubber specialties and as assistant in charge of production.

The North American Tire Co., Sioux City, Ia., has opened a branch at Sioux Falls, S. D.

New Syra-Cord Tire Being Produced by Syracuse Rubber Company

WORD is received from Syracuse, N. Y., that the new Syra-Cord tire, manufactured by the Syracuse Rubber Co., Inc., of that city, is now well into production. The first factory unit, now complete, has a capacity of 750 tires and 1000 tubes a day. Work on a second factory unit is about to begin.

In a recent talk to some visiting distributors, G. R. Loggie, president of the concern, stated that the trade will have no difficulty in regard to factory delivery when connection has once been made with the company. "Distribution will be taken on entirely according to our production facilities," he stated. "In other words, we will not add to our distribution any faster than we increase our production."

An advertising campaign, unusually extensive for such a new concern, was announced and it will be built around the

One of the notable features of the Syra-Cord tire is said to be its universal tread, which is reported to give a positive action against skidding, as well as the easy riding and steering qualities of the ribbed tread.

In this connection it is interesting to note that F. G. Mauthe, a veteran in the tire business, has been appointed manager of sales of the Syracuse Rubber Co. In 1905 Mr. Mauthe was with the Diamond Rubber Co., where he graduated from the job of inspector to a prominent position in the western sales force. His record there led to his appointment as New York manager for the Dayton Rubber Co., which concern he left to act as eastern branch manager for Goodyear. Just prior to taking up the Syracuse proposition Mr. Mauthe was special factory representative for the Marathon Tire & Rubber Co.

FIRESTONE SALES ENGINEERING DEPARTMENT.

The Firestone Tire & Rubber Co., Akron, O., has in operation at its various factories sales engineering departments composed of mechanical experts and technical men who apply their knowledge and experience to the solution of problems that confront the sales organization. Engineers in this department are trained not alone in tire construction methods, but are also versed in all the other various branches of the automotive industry. Some of them are experienced truck engineers and others give their special attention to automobiles; still others have made a particular study of rubber and fabrics, while the members of another group are experts in solving problems that confront the accessory dealer, tire repair man and vulcanizer. These engineers are working with the idea in mind that the broad requirements of truck and passenger car operation cannot all be filled by any one type of tire and they are always on the alert



G. R. Loggie, President, Syracuse Rubber Co.



W. E. Greer, Factory Manager, Syracuse Rubber Co.



F. G. Mauthe, Manager of Sales, Syracuse Rubber Co.

company's slogan: "Built by Cord Tire Specialists." Mr. Loggie also pointed out that W. E. Greer, factory manager of the company, is himself a specialist in cord tire building and has included in his staff some of the acknowledged expert tire builders of the largest tire factories in the country.

"The company chose Syracuse for its manufacturing center because of its close proximity to the most important purchasing points for raw materials and also because of its excellent facilities in the way of express and freight conditions," he said.

"After establishing a location we proceeded to go out and collect the best cord tire building talent we could obtain, as well as the most modern and up-to-date building equipment. Cord tire equipment is used exclusively throughout the factory."

HALF MILLION DOLLAR CONTRACT PLACED BY INDIA CO.

H. H. Yates, southern salesman for the India Tire & Rubber Co., Akron, O., recently placed a contract with a Texas distributor for \$500,000 worth of India tires for the first six months of 1920. Mr. Yates reports that buying in the South for spring deliveries has been earlier and larger this year than ever before. This condition he attributes to the unusual prosperity throughout the great southwest and to the anticipated scarcity of all tires this spring. The opening of the season finds no huge surplus of tires made this winter because more cars have been used and more tires sold during the past few months than any previous winter season in history. There has also been little opportunity to replenish depleted war time stocks.

in devising new ways in which the product can be made more serviceable to the purchaser. They are everywhere at work in the field, studying the performance of tires under various conditions, conferring with truck and car manufacturers, or in the factory applying the knowledge gained in the field.

A large fleet of test cars is operated by the Firestone Co. as a further source of information along these lines, which is always at work, units traveling in all sections of the country and under all sorts of conditions. As a result the sales engineering department is in a position to supply the needed coordination between the production and sales organizations of the company.

C. R. Collins, assistant general manager, and Lee Folger, Cottingham Co., have become directors of McClaren Rubber Co., Charlotte, N. C.

Optimism in Car Production

By W. O. Rutherford, Vice President, the B. F. Goodrich Rubber Co.

IT HAS always seemed to me that there is a good deal of sound philosophy in Benjamin Franklin's statement that we should beware of croakers. This advice is as sound today as it was 100



W. O. Rutherford, Vice President, B. F. Goodrich Rubber Co.

years ago. All industry has been confronted with menacing conditions during the months and years just past, but I am optimistic enough to believe that every major development in our international growth, in our civic reforms and in our economic readjustments will lead us to bigger and better things for the future. Every one of us should be an optimist, there is no room for pessimism.

By referring to one of my charts I notice that in 1905 there were 150,000 automobiles in the country; 15 years later we have passed the 7,000,000 mark. Now I hear much about the "saturation point" and that other indefinite period when we shall have "diminishing returns." Automobiles come in the "consumption" class of commodities; i. e., they are used, worn out—and replaced as an essential part of life just as clothing is. I forecast that we shall be able to absorb not only the present automobile production, but we shall even sustain the greater growth which ambitious manufacturers are meditating.

Hence it is a problem of production and every citizen, from the management to the worker at the bench, should do his share toward keeping an uninterrupted flow of raw materials and finished goods going through the mills, warehouses and stores of this country and every man has a right to share in the fruits thereof. In no other line of industry are the relations between capital and labor on a friendlier or sounder footing than in the automotive field, hence there should be no cause for apprehension.

So far as passenger vehicles are concerned we are now at the crest of a buying market. Production does not equal

demand and personally I expect this condition to exist for some time to come. I recall being told at one of the New York shows way back in 1907 that the then annual production of 60,000 cars marked the peak point in automobile manufacture and that the number of cars to be made annually would lessen rather than increase. Just as that prophet of gloom was suffering from brain storm so will I also classify those who today are refusing to advance with the times. The proposed car production for 1920 is 3,000,000 cars. An analysis of the market, at home and abroad, shows an ability to absorb even greater production, hence the possibility of a shortage of cars is imminent.

Rural Districts Disappearing.

The average reader may say, "Well, this growth of the automobile industry is all very nice, but wherein does it affect me?" Anything relating to the third largest industry in the country affects everyone. Thus within the past 10 years our cities have undergone a wonderful transformation. A decade ago Chicago boasted that it was 40 miles from one side of the city to the other. We marveled. But today cities having a population of only 2000 or 3000 spread themselves over as large an area. In some of our states the country is no longer rural, it is interurban. Think what this means for health and culture; again think what it means for real estate values.

(A certain authority estimates that for every million dollar's worth of automobiles produced there is produced another million dollar's worth of property values). Now consider how important it is that we should have a net work of highways in every community for freight and passenger traffic. Someone has said that highways are the measure of civilization. I believe this implicitly. So in the final summary my conclusion is that the number of cars produced during the years to come does not rest with a group of manufacturers in the central west, but lies rather in the hands of the general public. Authorize the building of suitable highways and the manufacturers will motorize them, greatly to the advantage of the community and the individual.

EATON BECOMES HEAD OF STANDARD PARTS.

Christian Grl, organizer and president of the Standard Parts Co. of Cleveland, O., one of the largest independent producers of automobile parts in the world, has been deposed from office under pressure from certain banks, and is to be replaced by J. O. Eaton, formerly of the Torbensen Axle Co., now head of the Eaton Axle Co. Associated with Mr. Eaton in the new management of the Standard Parts Co. will be, it is understood, John Younger, formerly truck engineer of the Pierce-Arrow Motor Car Co., and Charles S. Dahlquist, sales inspection engineer of the Timken-Detroit Axle Co.

It is stated that Mr. Grl's enforced retirement was the price demanded by

certain financial interests for the refunding of the corporation necessitated by the exigencies of its reconstruction. The underlying refinancing operation is being handled entirely by and through interests in Cleveland, and will take the form of a \$25,000,000 merger involving the consolidation of the Eaton Axle Co. with the Standard Parts Co. It is implied, however, that the real cause of this action lies in the fact that Mr. Grl, as the advocate and exponent of the standardized war truck, incurred the animosity of powerful financial interests in his home city.

Mr. Grl came into prominence in the automotive industry in 1906 as the founder of the Perfection Spring Co.

The latest development of the Standard Parts Co., which is stated to be in every respect a normal process and in no wise casting any reflection on its past conduct or present stability, was formally announced in Cleveland on Feb. 11 by Cyrus S. Eaton of Otis & Co. The capital of the revised enterprise will probably be about \$35,000,000, and it is expected that the consolidated companies will be doing a business of \$60,000,000 annually by 1921. The present activity may be judged from the statement that unfilled orders on the books now are in excess of \$23,000,000.

GILLIAM CO. ADDS TWO DIRECTORS.

The Gilliam Manufacturing Co., Canton, O., maker of Gilliam bearings, has voted to increase its board of directors from seven to nine members. It is made up as follows: President-treasurer, B. T. Steiner; vice president, P. K. Davis; vice president and assistant treasurer, W. H. Steiner; secretary, S. G. Zimmerman; general manager roller bearing division, George Lee Miller and M. S. Milbourne, H. B. White, W. L. Malotte and Clarence G. Herbruck.

The executive board consists of Messrs. B. T. and W. H. Steiner, Miller, Zimmerman and White.



J. O. Eaton, New President Standard Parts Co. of Cleveland, O.

Points on the Spring Overhauling of the Automobile

DIRECTIONS FOR MAKING ADJUSTMENTS AND REPAIRS IN PRIVATE GARAGE.

IN THESE days when high prices have invaded every activity of modern life, the cost of the annual spring overhaul and adjustment of the motor car may well be considered with seriousness by the average motorist. For the increase in the price of labor and material will doubtless necessitate an advance in charges at repair shops and service stations to a point this season never before reached.

The car owner, when he contemplates putting his machine into commission again for the spring and summer season, will perhaps be moved from motives of economy, if by no other reason, to wonder if he cannot make at least some of the minor repairs and adjustments himself, and such are all that should be necessary if the car was properly cared for through the previous season and the details incident to putting it into winter quarters were carefully looked after.

If, however, as is frequently the case, the machine was put into storage without much thought as to its serviceability in the spring, the amount of work that may appear on close inspection of the car and its components to be necessary before bringing it back into satisfactory operating condition, will seem fairly staggering and, if performed at the repair shop, will call for an outlay of cash that will cut into the season's motoring allowance to a considerable extent.

However, while it is perfectly feasible to perform much of the ordinary overhaul work in the private garage, especially if the owner has had some experience

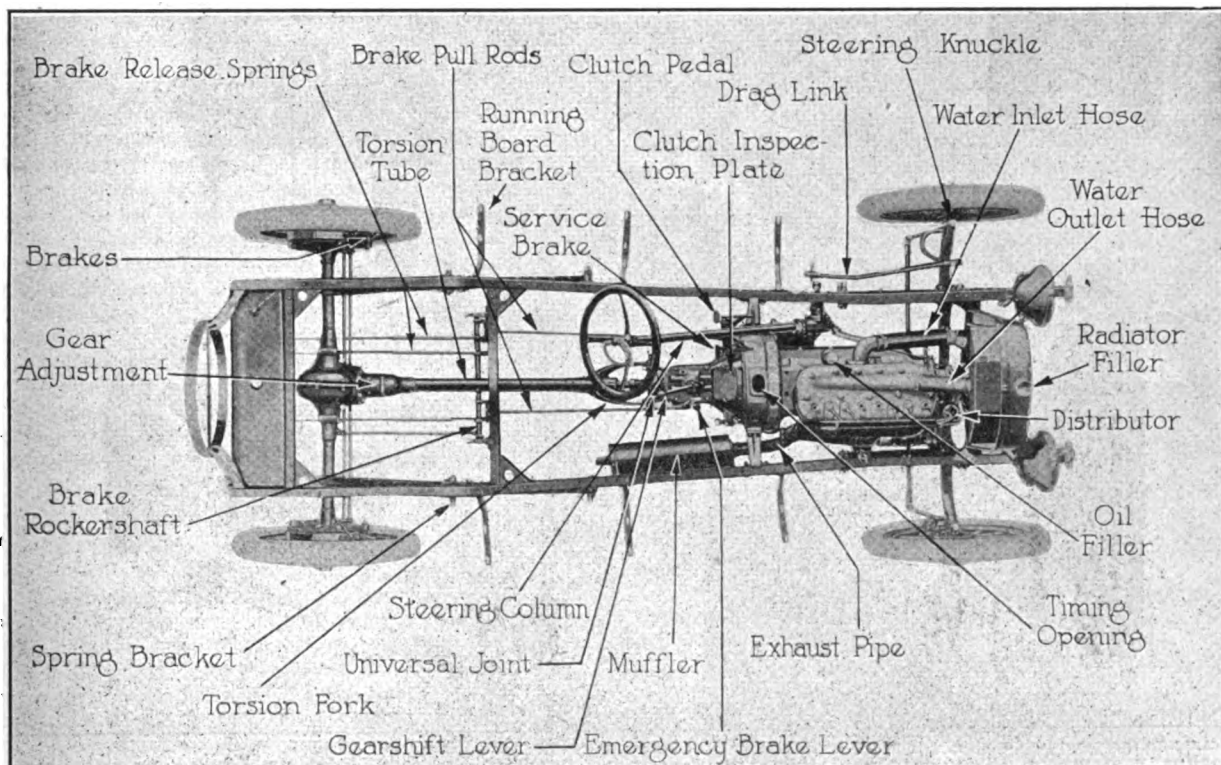
in the use of tools, is somewhat mechanically inclined, and has profited by observation of operations at repair shops and such knowledge as he may have gleaned from a perusal of instruction books, articles in motoring publications, conversations with repair men and other motorists, etc., it would still be advisable to have any extensive repair work, especially if the renovation or adjustment of the more important components or delicate mechanism is involved, at a regular repair shop or service station where tools and equipment are available for the convenient, economical and expeditious performance of the necessary work.

The experienced motorist can, however, if possessed of considerable mechanical expertness, perform nearly all the necessary overhaul work and adjustment on his car himself and in his own garage, if he has access to the requisite tools and equipment.

The purpose of this article is to assist as much as may be the car owner in the work of making his own repairs and adjustments. It is important that the work of inspection, renovation and adjustment be done in a thorough and systematic manner in order that no point, however, insignificant it may seem in itself, yet is important towards effecting a perfect tout ensemble, may be overlooked and that the work may be performed at the proper time and to the best possible advantage.

The Necessary Tools.

In the first place it will probably be necessary to supplement the assortment of tools found in the regu-



Chassis of the Modern Automobile, Showing the Location of the Components.

START WITH THE COOLING SYSTEM.

lar tool kit of the car with others more adaptable for the performance of special work that may be encountered and the following list is suggested:

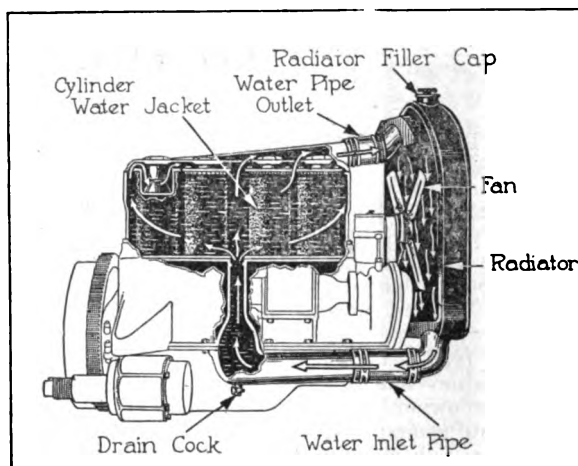
Blow torch, wire brush, valve lifter, hand vise, piston ring remover, hack saw, oil can, tinner's snips, small bench vise, soldering copper, acid and small riveting hammer, machinist's hammer, cold chisel, solid punch, center punch, three sizes of screw drivers, large, medium and small, socket wrench set, adjustable end wrench, three types of pliers, thin monkey wrench, large monkey wrench, Stillson wrench, carbon scrapers, set of three; set of end wrenches, including two of large size; set of files, including round, rat tail, oval, triangular, rasp and flat; adjustable end wrench, spanner, cotter pin puller and expander. This list is sufficiently inclusive to cover practically all work done on the car. If other tools are found to be necessary they can be purchased as the work progresses.

A few small boxes should be obtained for holding nuts, bolts and other small parts as they are removed, otherwise they might become lost. In removing bolts and nuts, make it a practise to run the nut and washer on to the bolt to which they belong and much time will thus be saved when reassembling the unit.

It is also good practise to tag the parts with the name of the components from which they were taken when disassembling.

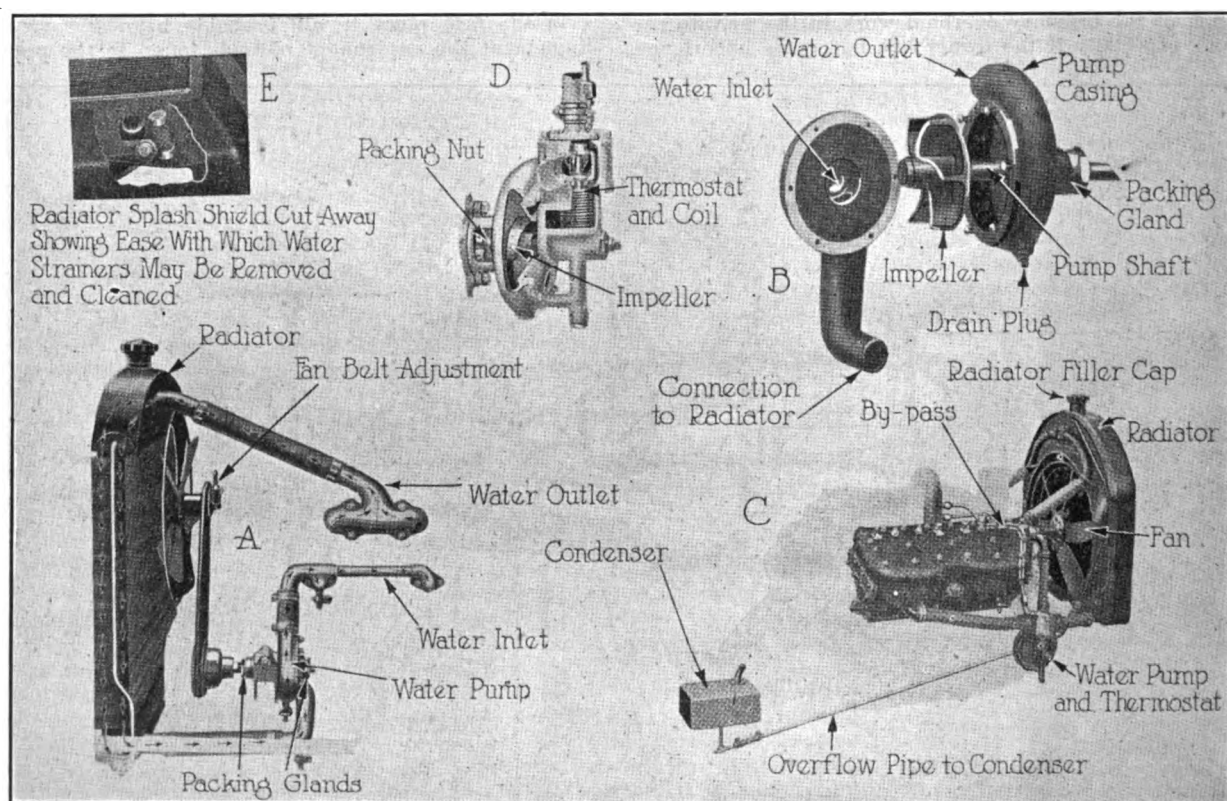
Cooling System.

In overhauling the car systematically a start should be made with the radiator. The recollections of last year's service should enable one to form an opinion as to its condition. If the engine ran hot much of the time and the water boiled, it is a sure indication that



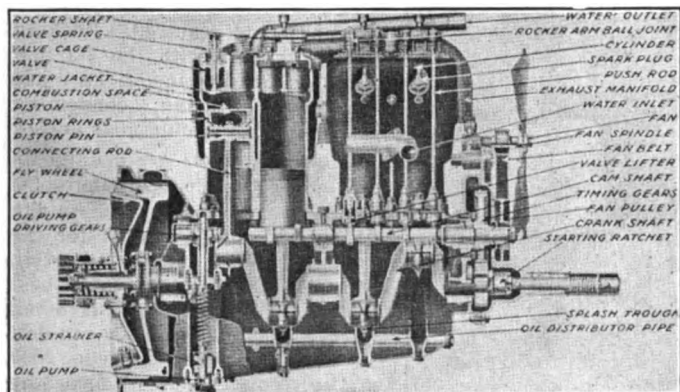
Thermo-Syphon Cooling System, Willys-Knight Four.

rust or scale are present in the radiator, connections and water jackets of the engine. This foreign substance can be easily removed by draining off the old liquid, if the radiator is full, and refilling with a solution of hot water and sal soda in the proportion of one-half pound of sal soda to five gallons of water, letting it stand for several hours, or if the car is in use the engine may be run for several hours with the solution in the radiator. The action of the sal soda and hot water will soften and loosen the rust and scale. After the solution has stood for several hours, open the drain cock, or better still, unscrew it from the radiator and allow the fluid to drain out. Rinse out several times with



Cooling Systems: A, Reo, Centrifugal Pump; B, Centrifugal Pump Disassembled; C, Cadillac Eight, Two Centrifugal Pumps, Thermostatic Control; D, Cadillac Eight, Centrifugal Pump and Thermostatic Control; E, Cadillac Eight, Radiator Drain Out Plug and Screen.

CARE OF THE RADIATOR AND FAN.



Modern Automobile Engine, Four Cylinders, Overhead Valves.
Showing Location of Components.

clean, cold water, and the liability of the engine overheating will be considerably lessened.

If the radiator has shown signs of leaking it will need soldering. To do this in a thorough manner remove the radiator from the car frame, after disconnecting the hose connection to the engine, loosening and removing the bolts that hold the radiator to the frame. Place the radiator on the work bench. To locate the leaks definitely the openings of the radiator should be plugged. Several methods are in use at service stations for this work, but the simplest and best for the motorist is that of fitting wooden plugs to the larger openings, replacing the radiator cap; then connect air from the air pump, or water from the pressure system, to the overflow pipe, which passes down on the inside of the radiator. To connect this pipe with air service an old valve stem from a discarded inner tube may be used. Cut off the lower or bottom end and solder it to the overflow opening. Pumping air into the radiator till a slight pressure has been obtained will enable the repairer to locate the leaks, by immersing the member in a pan of water. Bubbles rising through the water will show the location of the leaks, and with a knife or scraper made from a three-sided file that has been ground down to a point the leaks can be marked so that they can later be identified, when soldering.

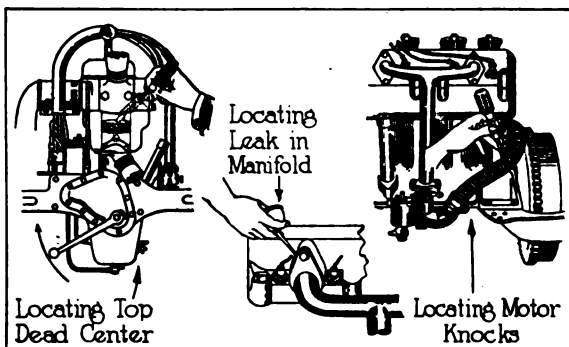
Remove the radiator from the pan of water after the leaks have been located; cut off the air pressure and place on the bench to dry. When dry take the soldering iron which has previously been heated with the blow torch, tin the copper by dipping it in the soldering acid and touching the solder several times till the point has become coated. While heating the iron a second time smear the point to be soldered with acid and when the iron is hot apply to the solder, transferring it to the leak, previously treated with the acid. Rest the heated copper on the radiator metal until it is warm and it will be found that the solder will adhere to the leak without dif-

ficulty. After all the leaks have been treated test the radiator again with the pan of water. If no further leaks are shown the next step may be taken. As further overhauling is contemplated on the engine the radiator can be left on the bench. If the old hose connections are found to be soft and spongy they should be replaced with new.

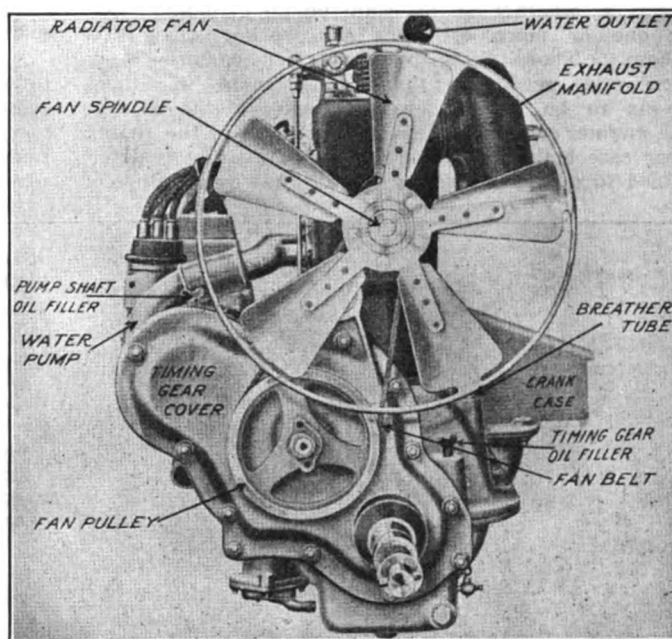
As the fan is a part of the cooling system on all cars and the water pump of many, both of these units will be treated under the cooling system at this time. Loose or worn fan belts should be adjusted or replaced with new. If found in good condition, but running loosely, adjustment of the belt will correct any defect of the fan. But if frayed or about ready to break, a new belt should be supplied and adjusted so that the fan will turn easily. If the fan is noisy in the bearing it should be disassembled and examined for broken balls, chipped or broken cones or ball races that are cut or scored. When these conditions are found, replacement is the best policy. Adjust the bearing to

turn freely, but not loosely enough to be noisy. All new parts, such as bearings, should be treated with oil or grease at the time of replacement, so that later they will not be overlooked when the car is completely assembled and ready to run.

The water pump is usually of the centrifugal type, consisting of an impellor keyed or pinned to the drive shaft. Very few things can happen to this device but that will make themselves manifest before serious trouble occurs, except when frost forms around the impellor blades during the winter. Starting the car under these conditions will usually break the key, pin

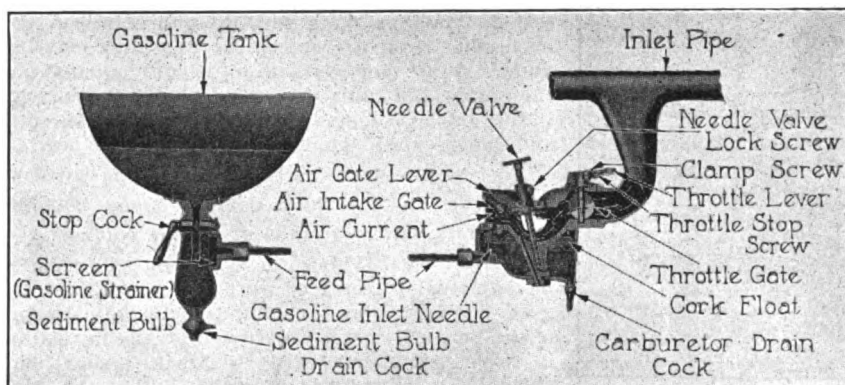


Method Used in Locating Top Dead Center and Knocks in Engine.



Front End of Modern Four-Cylinder Engine, Showing Fan Assembly.

OVERHAULING THE ENGINE.



Ford Gravity Feed Fuel System, Showing Location of Principal Parts.

or hub, allowing the shaft to turn free of the impellor, causing the engine to overheat in a short time.

If the car has been in storage during the winter months nothing of this kind probably will have occurred, but mention is made of it, showing the trouble that may occur at this point in some instances when run under cold weather conditions. The packing at each side of the pump should be renewed if it has been in use for some time and is found to be dry. Unscrew the packing nuts as far as they will go, dig out the old packing and supply new. This can be made from wicking, purchased in the form of a ball. Unroll a length double several times and twist into a thick string, soak in oil and insert in the pocket around the pump shaft next to the pump casing. Set up the packing nut till the oil squeezes out on to the shaft. This adjustment will probably have to be made tighter later after the engine has run for several hours.

Overhauling the Engine.

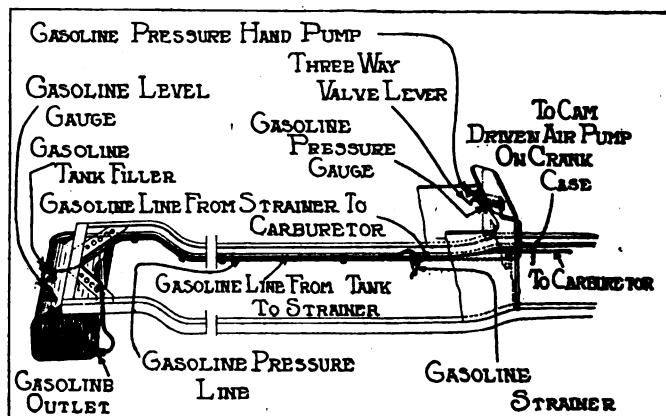
As a test of the condition of the engine, turn it over with the starting crank. Note the compression, whether it is equal on all cylinders, or one or more cylinders are weaker than others. Those that are weak lack compression and need attention. Also note if there seems to be rod or bearing noise in the base of the engine, or whether the timing gears in the timing gear case make unusual noises. By this test is determined to a greater or less extent what overhauling of

the engine is required. Rocking the crankshaft with the starting crank will determine if there are crankshaft bearing, connecting rod bearing or timing gear noises.

Leaking valves are usually indicated by backfiring taking place in the carburetor for the intake valves and in the muffler for the exhaust valves. This indication of weak valves is shown to best advantage when the car is being operated on the road. A car that has been driven between 2000 and 3000 miles should have the valves ground, for after this period of use the valves and valve seats will probably have become

coated with carbon and pitted, necessitating regrinding.

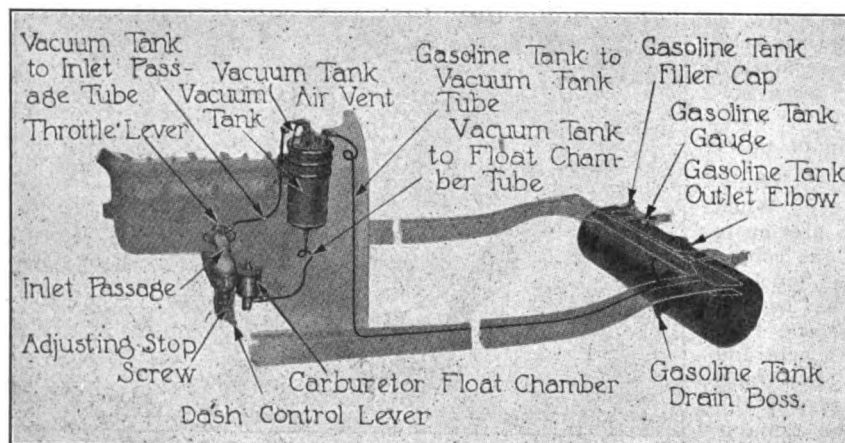
Many of the older engines do not have the separable head, while that type is almost in universal use in later models. Where the separable head is not used it will be necessary to unscrew the valve plugs in the heads of the engine cylinders, allowing the valve head



Pressure Fuel Feed System, Indicating Principal Parts of System.

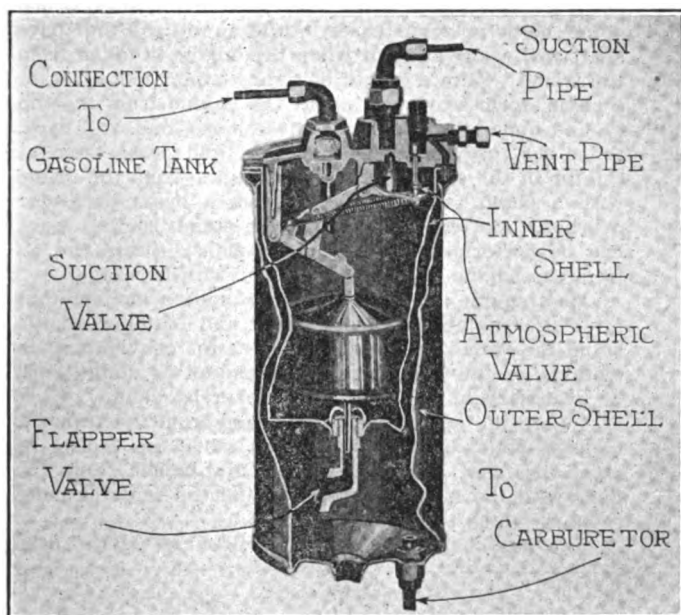
to be exposed. These should be taken off and laid aside in the order that they are taken from the engine together with their gaskets. The valve springs are next removed and where they are not enclosed are easily reached. If enclosed by a side plate, remove the side plate by loosening and removing the nut that holds it to the side of the engine. Next, with a valve lifter, raise the spring and the cap at the end of the spring, uncovering the small pin that is placed through the valve stem, holding the cap and keeping the spring under tension. Release the valve spring holder and repeat the operation with the next valve, and so on till all of the valves to be ground are freed of the springs.

Where the engine is equipped with a separable head the head bolts are taken out, and the head pried up from its gasket and removed. Separate the gasket carefully and examine its condition



Vacuum Fuel Feed System, Showing Principal Components.

REMOVAL OF CARBON DEPOSITS.



Sectional View of Vacuum Tank.

and if it can be used again, place it one side where it will not be damaged. The valves thus prepared for removal are withdrawn one at a time and examined carefully for pit holes in the metal and carbon accumulation on the head, and laid aside in the order in which they are taken out of the valve and the shoulder of the stem. Carbon deposits are removed easily by scraping or, in case of the stem, with a strip of emery cloth wrapped around the stem and rapidly pulled back and forth.

Carbon in the separable head engine can be removed by scraping with a putty knife, while in the L-head type, where valve plugs are used, it is best gotten rid of either by burning with an oxy-acetylene outfit or scraped by hand with the carbon scraping tools.

After the valves are cleaned they should be set back into the valve guides in their respective places and ground one at a time. To do this use carborundum powder, which can be purchased from any supply house in three grades, fine, medium and coarse. The coarse powder is taken first, to cut rapidly, while the medium and fine grades are employed for valves that are in good order, but simply need touching up, and for giving the face of the valve a smooth finish after grinding with the coarser abrasive.

The valve should be ground with a half-rotary motion imparted to the grinding tool, turning the tool one way for a full turn

and then reversing the direction of motion. Bits are supplied with the various grinding tools that are adapted to the various valves, as some makes have two holes drilled in the head, while others are slotted.

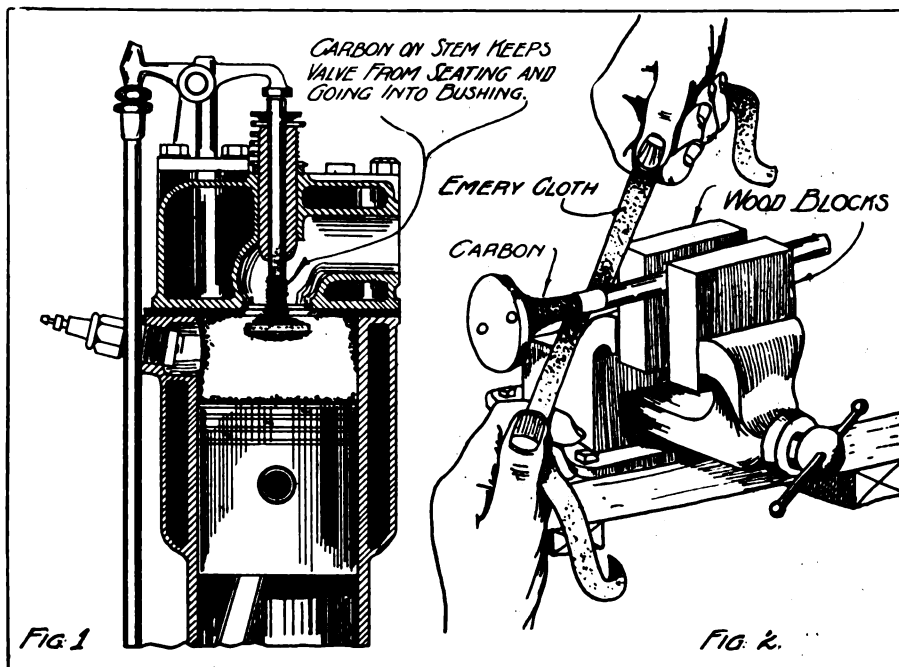
To grind the valves, take some of the coarse or medium grinder powder and place it in a shallow dish or tin; mix with oil to the consistency of paste. With the finger smear this paste on the face of the valve, slip the stem into the valve guide and grind the valve as described above. A light tension spring should be placed on the valve stem to assist in raising the valve from its seat after grinding a few turns. This allows the abrasive material to spread and brings new cutting power to the material. When the cutting effect is exhausted remove the valve, wipe off the abrasive and apply new. Continue the process till a ring 1/32 inch is shown all around the face of the valve. Many repairers stop at this point, considering that the valve seat will fit more tightly than when the ring is polished more brightly. However, if it is desired to brighten the ring, finish off with the fine powder. A wad of cotton waste should be placed under the valve seat in the opening to the combustion chamber to prevent the abrasive from entering the combustion chamber, later getting into the cylinders and causing harm waste should be removed after grinding the valves.

Remove all traces of the abrasive from the valve face and seat with a dry cloth or piece of waste so that the material cannot work into the cylinders between the pistons and cylinder walls, causing scores or scratches, thus weakening compression.

Replace the valves in the order in which they were removed from the engine, using the valve spring tool to replace the pin in the lower end of the stem under the spring cap.

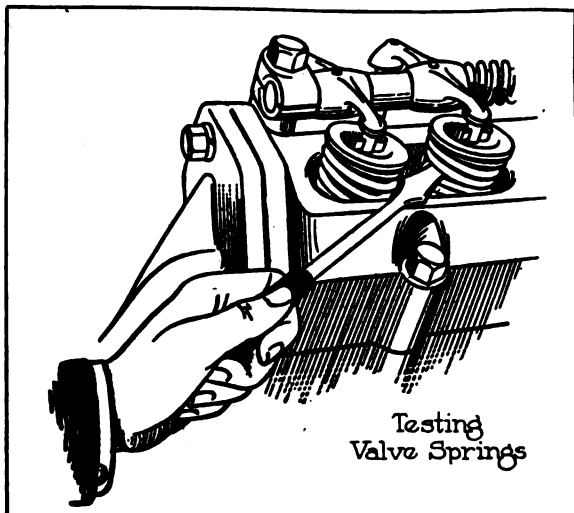
Adjusting Bearings.

With certain types of engines it is better to remove the power plant from the frame of the car, especially



Cleaning Carbon from Valve Stem: Fig. 1, Carbon Deposit; Fig. 2, Removing Carbon with Strip of Emery Cloth, Holding Valve in Vise.

ADJUSTMENT OF BEARINGS.



Increasing Valve Spring Tension to Prevent Skipping of Engine.

where it is intended to do more or less bearing overhauling, while on others this work can just as well be done with the engine in the car frame. Whether the engine should be removed or not depends on the amount of work to be done. If new bearings are to be fitted the engine had better be removed, while if they are only to be adjusted the work can as well be performed with the engine in the car.

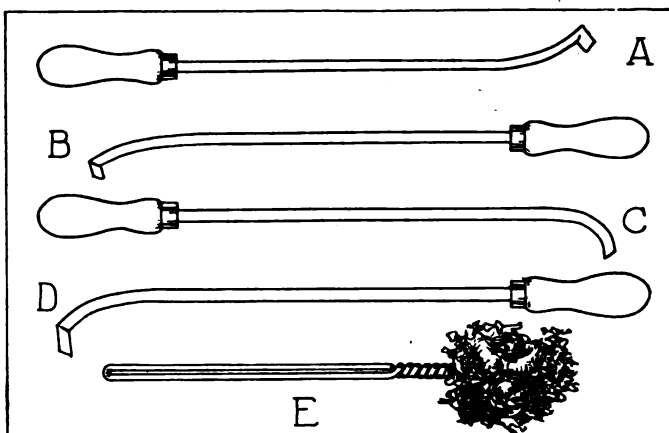
Both methods will be described. When taking the engine from the frame, all wires connecting the component and its parts with the dash or storage battery are disconnected, tagged and tied back out of the way, preferably to the dash. Loosen and remove the bolts that fasten the engine to the car frame and cross member at the front. Remove gear shift and emergency brake levers in the front compartment, disconnect the clutch pedal and the universal joint back of the

set if necessary. This is done by removing several machine bolts in some cases, while in others the drive shaft will easily slip out when the engine is taken from the frame. With a length of strong rope, steel cable or a chain, form two loops about the engine from the top around under the base; slip these loops, one well back, the other forward under the base, and cross them at the top of the engine. Hoist the engine from the frame with a chain falls suspended from a beam or girder overhead, and set it on an engine stand, so that work can be performed on it from all sides. Drain the oil from the engine base and wash out with kerosene.

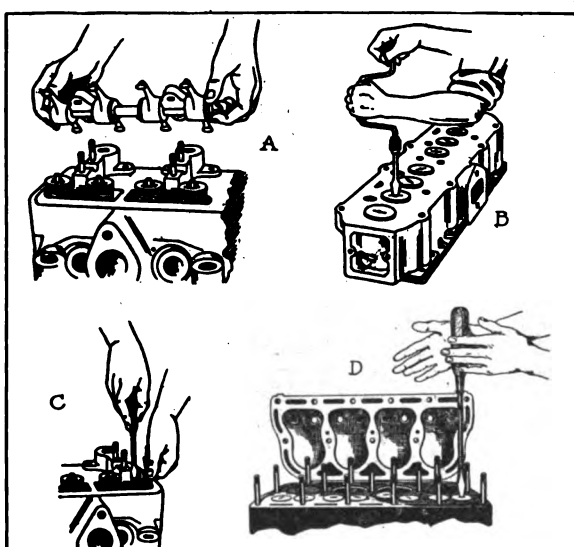
Most engine stands are made in such a manner that after the engine has been placed and fastened to the stand the frame can be turned over for convenience in working on the bearings. If this cannot be done it will be necessary to turn the engine over by hand.

Where the engine is not removed from the frame it is good policy to raise the front wheel on blocks or hoist the front end of the car a few inches from the floor with the block and falls, giving the repairer more room in which to work.

The base bolts, holding the two halves of the base



A, B, C, D, Carbon Scraping Tools; E, Brush for Removing Carbon Dust from Cylinder Head.



Preparing Separable Head Engine for Valve Grinding and Carbon Removal: A, Removing Rocker Arms and Rocker Arm Shaft; B, Grinding Valves with Brace; C, Removing Valve Spring Fastening Pin; D, Grinding Valves with Screw Driver Held Between the Palms of Hands.

together, are loosened and removed, allowing the lower part of the base and the gasket between the two halves to be separated from the upper half and placed one side after cleaning.

The main and connecting rod bearings are now plainly seen. The main bearings are first examined for looseness and end play in the crankshaft. End play can be determined by attempting to move the shaft endways. In heavy engines this defect will not be as noticeable as in the lighter type or lower powered engines. Looseness of the bearings can be best determined by turning the crankshaft with the hand crank. If it turns freely and without much effort, the bearings should be adjusted. If on the other hand there seems to be a drag or resistance to the turning, it is a pretty good indication that the bearings are tight or nearly so.

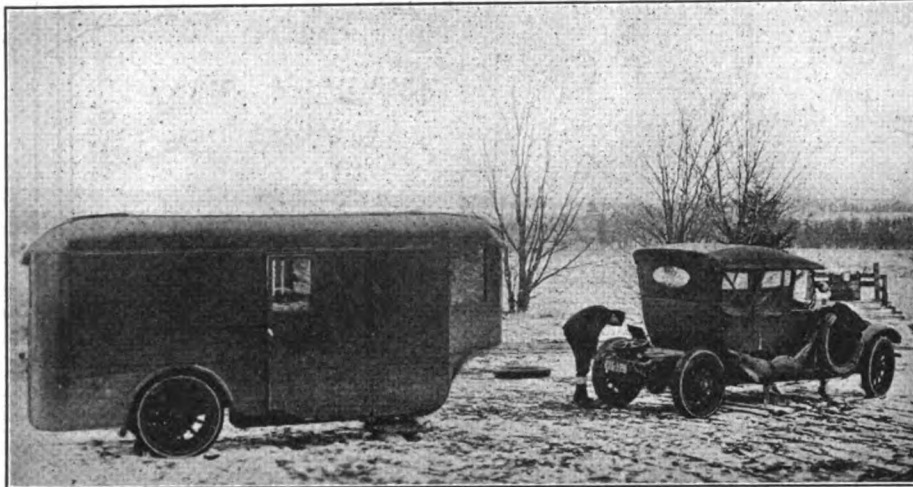
To adjust loose main bearings, first cut the wires that pass through the drilled holes in the nuts of the bearing studs. Loosen and remove the nuts and washers, take out the bearing cap and remove one or more shims at each side of the stud.

(To be continued in May issue. Copies containing these discussions should be retained, as all the installments will form a complete overhaul review.)

Digitized by Google

Glenn Curtis Designs Motor Bungalow

The accompanying illustration shows a motor bungalow, designed by Glenn Curtiss, the well known maker of air craft, which simplifies the housing question for a family during its vacation period.



Motor Bungalow Designed by Aviator Glenn Curtiss Offers All the Comforts of Home. (Photo by Kadel & Herbery, New York.)

As will be noted, it is in the form of a trailer, and is a compact vehicle that is easily drawn by the ordinary motor car. When a suitable camping spot is located the vehicle is ready for use, affording many of the comforts of home, and it thus serves the purpose of a portable cottage or bungalow. It may be detached from the automobile and used as a headquarters from which long or short trips may be made in the car to points in the vicinity of the camping place either for pleasure or business.

The bungalow has windows front and rear and is sufficiently commodious and has facilities for entertaining visitors. It has a compartment for a kitchen, and is equipped with electric lights and running water and in addition to sleeping accommodations for regular passengers it is provided with a tent cot for the chauffeur. Its especial use becomes apparent when it is opened up for camp service. By raising the sides and inserting screen frames, two complete rooms are provided with sleeping accommodation in the front end for two people and for four in the rear compartment. In rainy weather meals can be conveniently served inside, the sleeping berths providing seats. The material of which the bungalow is made is covered wood veneer.

The accompanying illustration shows the bungalow attached to a car, with the chauffeur making repairs on the automobile wheels.

FORD BAND TO JOIN MICHIGAN TOUR.

Because of his interest in good roads work, Edsel B. Ford, president of the Ford Motor Co., Detroit, Mich., is to send the entire band of that company, composed of 55 pieces, under the direction of Harry C. Philp, to accompany the an-

nual tour of the Michigan Pikes association through Ontario and Michigan, July 14-29.

The band will give a short concert in every city en route, preparatory to the good roads meeting. In the night stop cities evening concerts of greater length will be put on and also at the noon stops.

In addition to the Ford band the com-

pany is sending a staff of motion picture operators to film the tour.

The tour will cover 1359 miles in the 15 days, with 785 miles in Ontario and 574 in Michigan. Its night stops are Windsor, London, Toronto, Bracebridge, North Bay, Espanola, Thessalon and Sault Ste. Marie, Ont., and Sault Ste. Marie, Cheboygan, Alma, Jackson and Detroit, Mich.

The Apperson Motor Car Co. of New England has taken temporary possession of sales rooms at 965 Commonwealth avenue, Boston, pending the completion of its new building in which the sales rooms and service station will be consolidated.

Sugar Automobile at Seattle Show

Evidently the scarcity of sugar was not marked in the northern section of the Pacific coast at the time of the annual automobile show at Seattle, Wash., the week of March 15, judging from the accompanying illustration.

This was one of the unique features of the show, the construction in sugar of an automobile, by George Kosak, head pastry artist at the Chauncey Wright Restaurants Co. Hazen J. Titus, president of the company, calls it the "C. M. R. C. 12-Cylinder" car.

Note the luxurious appointments of the tonneau, the elaborate ornamentation of panels, etc., and other details that have been well exemplified in this creation of the Chauncey Wright Restaurants chef.

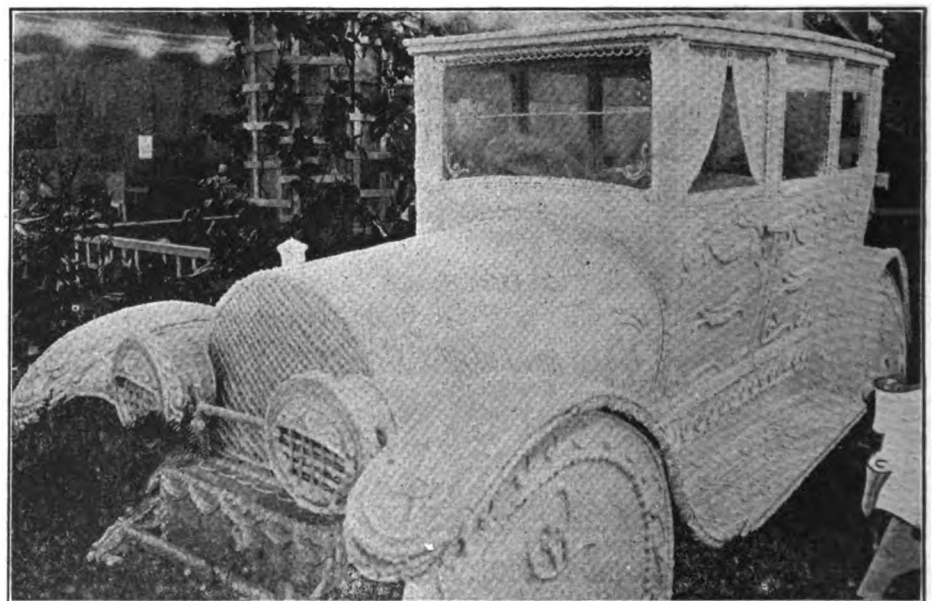
MEXICAN EXPOSITION IN 1921.

The Mexican Ministry of Industry, Commerce and Labor, has begun preparations for a commercial and industrial exposition to be held in Mexico City in September, 1921, in commemoration of the first centennial of Mexican independence. Invitations are to be extended to all foreign governments to send representatives to attend the exposition as well as to the chambers of commerce of the principal cities of the world.

J. & B. SUIT SETTLED.

It is stated that the suit brought by the J. & B. Manufacturing Co., Pittsfield, Mass., against the Gray-Heath Co. for infringement of the Jacobson patent, No. 118,451, for a timer for Ford cars, by the timers made by the Cuno Engineering Co., has been settled.

It is reported that the Cuno company has taken a license from the J. & B. Manufacturing Co. and will continue to manufacture its timers.



Automobile Made of Sugar by Chef Kosak of Chauncey Wright Restaurants Co., Seattle, Wash.

ACCESSORIES DEPARTMENT

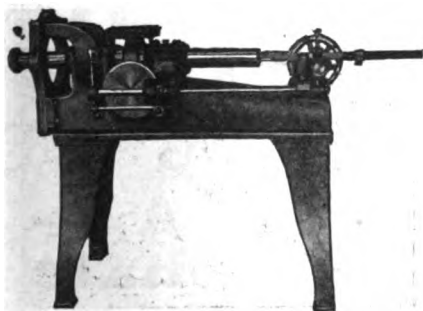
The Piston Clamp for Ford Cars is desirable when assembling the connecting rod to the piston, as a great number of connecting rods are twisted when they are assembled in the vise. This is due to the leverage and pressure to which the con-



necting rod is subjected when assembled in this manner. This device is also used for holding the piston while reaming bushings for wrist pin. It is lined with babbit in order that the piston and rings cannot be marred and is of a size that will care for all over-size Ford pistons. Net weight, 15 pounds.

Sold by the Fairbanks Co., New York. Price, \$10.

No. 5 Marvel Cylinder Reborring Machine is a tool for the service station, machine shop and garage. It comprises a power driven machine used for reboring automobile, truck and tractor engine cylinders, and is claimed to do the work in a more satisfactory manner than can be done by grinding or otherwise. The operation is simple.



Every working part is automatic and is designed for the purpose of making it possible for the operator to secure the best results. The automatic stop feature makes it possible to set the machine to any desired depth, both on the advance and return, and it will automatically stop without attention.

The friction disc feed makes possible any desired feed from 26 to 120 threads

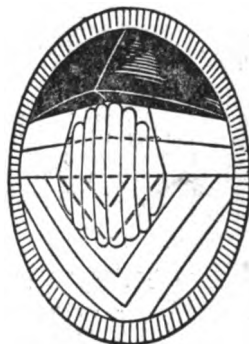
to the inch either with the advance or return of the bar. This feature is convenient for the operator, as a hurried roughing cut with the coarser feed and finish with a fine feed cut can be made, thus producing a perfectly smooth cylinder wall entirely clear and free of any foreign substances which might otherwise become embedded in the walls.

The machine calls for less mechanical skill than some machines of this type. Ample room has been provided between the face plate and front bearings to make it easy to make the necessary adjustments on the cutter head. Each cutter head is provided with a graduated scale to aid the operator to set it to the desired over size reboring.

It is claimed that the machine will re-bore any gas engine cylinder within its range inside of the limits set by the Society of Automotive Engineers. According to the depth of cut, it is five to 20 times as fast as a grinder and equally as accurate, the maker states. This machine covers the whole range of automobile engine work within its range and will handle motorcycle or tractor engine cylinders with the same results, it is claimed.

Manufactured by the Marvel Machinery Co., 1301-7 South Third Street, Minneapolis, Minn. Prices on application.

The Violet Ray Lens is a headlight lens of unusual quality that is fitted to regular headlight frames by simply taking out the regular glass lens and replacing with the Violet Ray Lens. The lens is of a patented design and is made in such a form that it conforms to the requirements of the various state laws concerning headlight glass, and has the added feature of



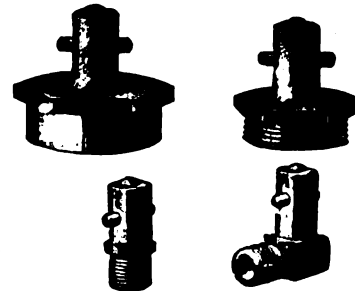
a colored glass of violet color which is pleasing to the eyes of motorists who meet cars equipped with it while driving at night.

It is stated that the light given by the Violet Ray Lens is similar to that of daylight, and the effect is gained by the manufacturer developing a glass of steel blue color that eliminates the bad effects found in using plain white glass.

Manufactured by the L. E. Smith Glass Co., Mount Pleasant, Pa. Price, \$3 per pair, any size; \$3.50 on the Pacific coast; \$4 in Canada.

(When Writing to Advertisers, Please Mention the Automobile Journal.)

The Alemite Lubricator Grease Gun was designed to eliminate the disagreeable features of filling and turning down grease cups on spring bushing bolts, steering arm spindles, etc. The gun consists of a container holding the grease, a removable head that is screwed to the top of the container, a threaded rod passing through the top of the screw cap having



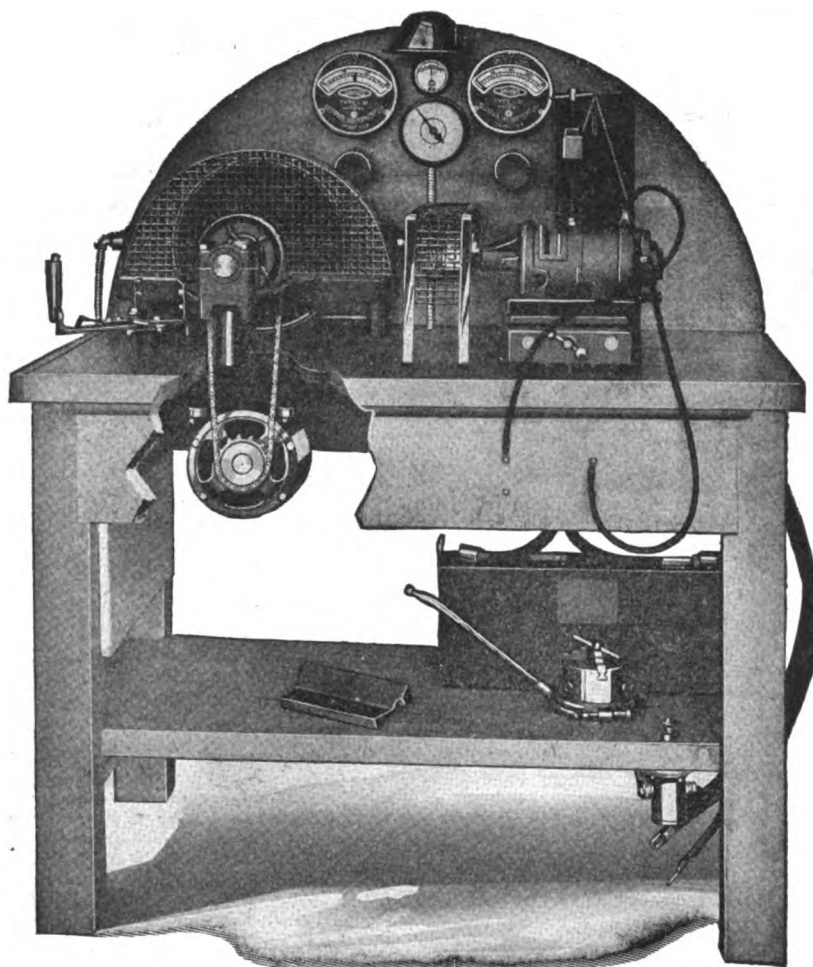
a handle attached at the upper end for easy manipulation and a leather-faced plunger at the bottom of the rod inside of the container.

Grease is supplied to the container by removing the screw top and plunger. A flexible tube is fastened to the threaded connection at the bottom of the container by a hexagon coupling, the other end of the tube terminating at a bayonet connection to which are attached the various caps fitting the grease cups of the car. The connectors are four in number, two fitting the tops of grease cups, a third fitting oil ways in steering spindles, etc., and the fourth, an offset connector, fit-



ting other small oil ways. The connectors are provided with a ball valve, which prevents the grease from working back out of the connector after the gun has been disconnected. It is stated that by giving the handle one-half turn the grease is forced into the bearing under 500 pounds pressure, reaching and lubricating every part, and that 30 bearings can be lubricated in 15 minutes with this device.

Manufactured by the Alemite Lubricator Co., 2641 South Michigan Avenue, Chicago, Ill. Prices and literature on request.



The Universal Test Bench is designed for testing all starting motors, generators and magnetos that are used in the modern automobile and truck. The patented universal vise holds any size, shape or make of magneto, starting motor or generator. Only one adjustment is necessary and there is no aligning to be done. The sprocket on the drive shaft of the transmission is moved along until the drive chain is in alignment and, it is stated, that making the complete set up requires only a few minutes.

There is a variable speed friction drive transmission operated by a two horsepower motor, the speed being controlled by a lever with thumb release. The friction drive operates either forward or reverse and gives any desired speed. Two six-volt batteries are provided for testing starting motors and generators and two universal three-jaw chucks are furnished, one with sprocket for driving generator and one with prony brake for testing starting motors. The chucks take any size shafts in use today and sleeves are

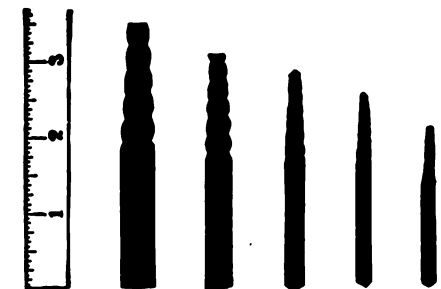
furnished for taking all standard tapered shafts.

The equipment includes an ammeter reading from 25-0-25 for testing generators and one reading from 0-600 for testing starting motors. A voltmeter indicates at what voltage the generator cuts in and a Van Sicklen tachometer shows the speed of the magneto or generator at all times. A sliding adjustable 12-contact plate varying from 1/32 to 1/2 inch gap is provided, which accurately indicates the spark for all cylinders at one time, and there is a detachable scale feeding up to 30 pounds which gives the exact road pounds exerted in the starting motor.

A double-throw switch gives either six or 12 volts for generator test. All moving parts of the bench are covered by safety guards and it is made of seasoned maple, 35 inches high, 28 inches wide, 48 inches long and a two-inch solid top. The height over all is 58 inches and the shipping weight is 800 pounds.

Manufactured by Becker Brothers, 23-25 North Jefferson Street, Chicago, Ill. Price on application.

The Ezy-Out Screw Extractor No. 15 Set consists of five sizes of Ezy-Out screw extractors in a neat box and of a convenient



size for the tool room. The sizes are known as Nos. 1, 2, 3, 4 and 5, and are de-

(When Writing to Advertisers, Please Mention the Automobile Journal)

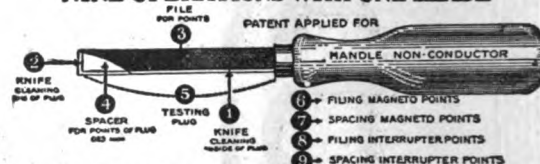
signed with particular reference to the needs of the tool room and the lighter type of machine shop work.

The Ezy-Out tool is made of high-grade steel, is shaped similar to drills, having a square end to which may be fitted a tap wrench. The lower end is provided with a coarse, left hand thread that is inserted into a hole drilled in the broken stud or set screw. Turning the tool with the tap wrench has a tendency to turn the screw in the direction which removes it from the threaded hole. It is stated that studs and screws may be removed very quickly by the use of this patented device. Made and sold in four sets of varying sizes for all classes and grades of work.

Manufactured by the Cleveland Twist Drill Co., New York, Cleveland and Chicago. Prices on request.

The "Ace" Spark Plug Tool, it is stated, is capable of accomplishing nine different operations with one blade, as follows: 1, knife used for cleaning inside of the plug;

ACE SPARK PLUG TOOL NINE OPERATIONS WITH ONE BLADE



Knife, Rim Cleaner, File, Spacer and Tester

2, end for cleaning rim of plug; 3, file for plug points; 4, spacer for accurately setting the plug points to .025 of an inch; 5, blade for short-circuiting plug; 6, filing magneto points; 7, spacing magneto points; 8, filing interrupter points; 9, spacing interrupter points.

The Ace spark plug tool is fitted with a non-conductor handle, providing insulation when testing plugs for short circuits, and is fitted with a highly tempered thin steel blade.

Manufactured by the Wallace Manufacturing Co., Inc., Newark, N. J. Price, 50 cents.

Permasal One-Piece Piston Rings are designed for replacement purposes in automobile, truck and tractor engines where a reduction in gasoline and oil consumption is desirable. It is stated that the use of Permasal rings in an engine will create a maximum of power and speed with a minimum amount of fuel; that they prevent leakage of oil and gas by the



pistons and convert a sluggish, powerless engine into one of high compression, powerful, smooth running and economical. Permasal rings are of one-piece construction and are easily installed by the repairer. Full instructions accompany each set, showing the correct method of installation.

Manufactured by the Grundy Manufacturing Corporation, Detroit, Mich. Prices according to the size of ring.

Spencer Axle Shafts are designed for replacement purposes on many of the smaller cars, such as the Ford, Overland, Grant, Studebaker, Maxwell, Chevrolet, Chandler, Dodge and the Smith Form-a-Truck.

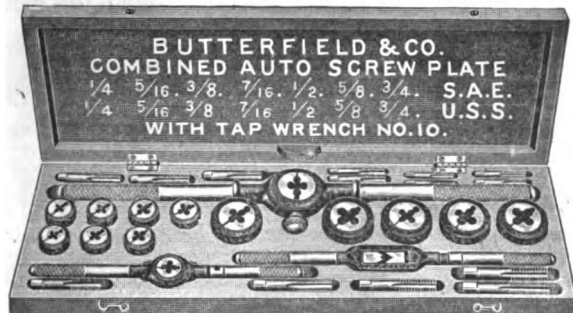
The axle shafts are made of .35-.45 carbon special alloy steel, hot rolled. The shafts are accurately machined and ground, are interchangeable and guaranteed by the manufacturer to be correct



as to size and workmanship. All shafts are carefully inspected, when finished, for flaws or imperfections, and those not up to the standard set by the manufacturer are discarded. The shafts are then carefully oiled and packed to prevent rusting and are ready for delivery.

Manufactured by the Spencer Metal Products Co., Spencer, O. Prices and literature on request.

No. 3100 Derby Combination Screw Plates. Every garage and repair shop finds need sooner or later for a combined tap and die set. The No. 3100 Derby Combination Screw Plates, using both the U. S. and S. A. E. standard threads, are especially adapted for this class of work, including, as they do the proper sizes of



both taps and dies and the handles for the use of them.

They are put up in sets of sizes ranging from five, seven, eight, nine and 10, including the different threads 10, 14, 16, 18 and 20. The prices increasing with the number of sizes and the number of threads included in the set.

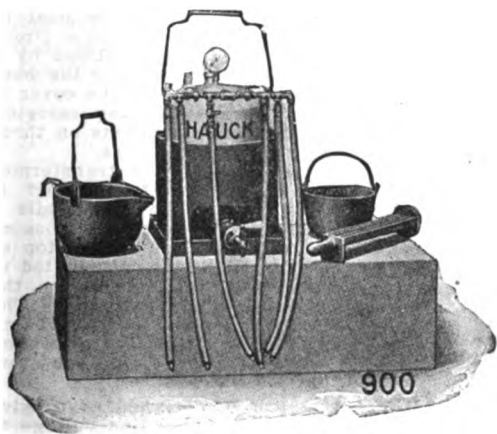
Manufactured by Butterfield & Co., Derby Line, Vt. Prices on application.

The Hauck Storage Battery Repair Outfit is designed for use in service stations where many storage batteries are sealed and unsealed during the day, and where time is an item of great importance.

The outfit consists of a 1½-gallon kerosene heating furnace equipped with hand pump; steam generator of 2½ gallons capacity, with gauge, safety valve, fittings, manifold and six 20-inch lengths of rubber steam hose; one melting kettle of 1½ gallons capacity for heating sealing compound; one lead melting pot of 35 pounds capacity, and one lead mold which molds bars 15 inches long by 5/16 inch in diameter.

It is stated that the Hauck storage battery steamer is capable of producing steam within seven minutes from the time of starting and that it will steam out the cells in storage batteries and permit the cell plates to be removed without any trouble, requiring from four to seven minutes to take out the plates in a three or six-cell battery.

The outside of the battery can be easily cleaned of all grease and mud by applying steam and rubbing with a brush.



The outfit is made throughout of the best of materials for the purpose, by mechanics of many years experience in making this class of goods.

Manufactured by the Hauck Manufacturing Co., 101-113 11th Street, Brooklyn, N. Y. Price, complete, \$40.

The Stay Clean Timer for Ford Cars consists of a timer elevator that raises the timer above the oil and dirt at the end of a Ford engine and places the timer in an accessible position.

The timer elevator consists of a cast frame that is positioned in place of the regular Ford timer, extends upward and is

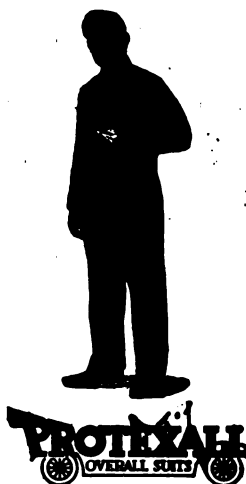


equipped with a drive shaft with bevel gear attached at the bottom of shaft. A second bevel gear is provided that is installed in place of the regular roller contact on the cam shaft and meshes with the gear on the elevator shaft. The Stay Clean Timer is placed at the top of the elevator, and the contact of the timer is fastened to the shaft at the top. Provision is made for fastening the timer case by an arm cast as part of the elevator, extending out at one side, having a spring attached. This spring acts as a tension on the timer case, positioning it with relation to the contact roller of the timer.

It is stated that the installation of the Stay Clean Timer is a very simple matter, requiring about 30 minutes, and may be done by anyone handy with tools.

Manufactured by the Milwaukee Air Power Pump Co., 888 Third Street, Milwaukee, Wis. Price, \$40.

"Protexall" One-Piece Overall Suits No. 116 feature exclusively the one-piece back design for a work suit, giving a garment which offers exceptional qualities of comfort.

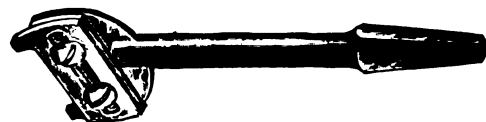


The material used in making these garments is government khaki, closely woven and fast color. Front pockets are set in similar to overall pockets, placed at the side and slanted sufficiently to make access to them easy. A combination pencil and watch pocket, two hip patch pockets, double stitched and reinforced, rule pocket and hammer hanger are also provided. The collars may be either open

roll, loose or tight buttoned as desired. All seams and edges are double-stitched and felled, giving double strength with no raw edges. The garment is made for rough work about the garage, service station or for the motorist who does his own repairing and is designed for a very strong garment.

Manufactured by the Globe Shirt & Overall Co., Corner Main and Pearl Streets, Abingdon, Ill. Prices on request.

The Empress "Perfect" Valve Grinding Tool is designed for use in an ordinary bit brace and has a swivel head, which permits grinding the valves from an angle, while the jaws are adjustable to fit any valve with holes drilled in the top,

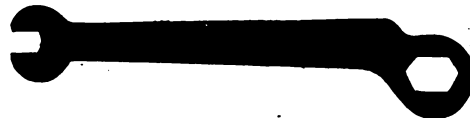


or may be removed entirely for a valve that has a slotted head. The jaws are made adjustable and care should be taken to have the projections equally distant from the center.

The "Perfect" valve grinding tool is of rugged construction and, it is stated, will withstand much abuse without breaking. The head is stamped from heavy sheet steel while the handle is made from steel rod.

Manufactured by the Bowen Products Corporation, Auburn, N. Y. Price, 50 cents.

The "W. & B." Spark Plug Wrench is designed to easily reach the spark plug of automobile engines, removing them easily and quickly without danger of breaking the porcelain insulators of the

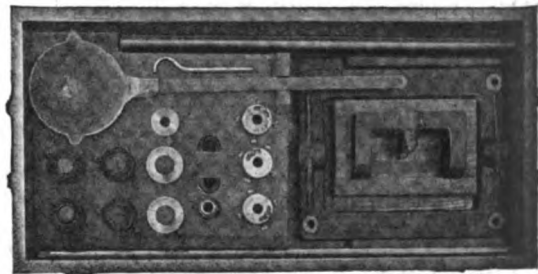


plugs. It is made of drop forged steel and is stated to be the most convenient wrench yet designed for its purpose.

The box end has a ¾ inch opening for a ¼ inch spark plug, while the open end accommodates the fire plug, ¼ inch United States standard cap screw, ¼ inch A. L. A. M. standard nut, ¼ inch A. L. A. M. standard cap screw and 9/16 inch set screw.

Manufactured by the Whitman & Barnes Manufacturing Co., Akron, O. Prices on request.

The Martell Rebabbitting Fixture is a complete outfit for rebabbitting the main and connecting rod bearings of the Ford

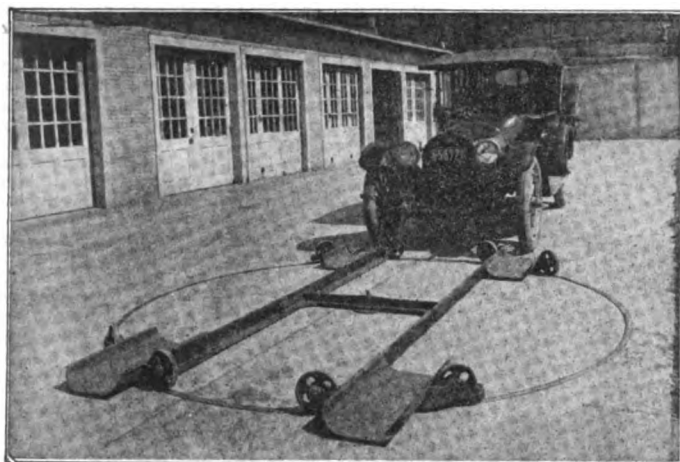


engine. It consists of a frame for holding a line arbor for pouring babbitt into main or connecting rod bearings, stops or dams to keep the babbitt from "spreading," a melting ladle and enough of the metal for a complete set of bearings.

The outfit is complete in every detail and by its use the repairer is able to run new bearings in the Ford engine, with very little practise. Simple, easily understood instructions are enclosed with each outfit.

Manufactured by Taft-Pierce, Woonsocket, R. I. Prices on request.

(When Writing to Advertisers, Please Mention the Automobile Journal.)



The R-W Pitless Ball Bearing Automobile Turn Table No. 363 is a simple, substantial and attractively made outfit, built entirely of steel and iron. The turn table is especially adapted for use in private garages, can be installed inside or in front of the garage as desired, it is claimed, and will accommodate all sizes of cars.

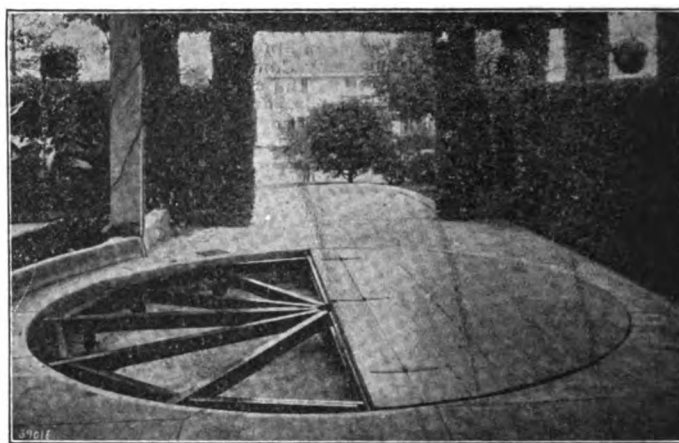
The weight of the turn table and car is carried on large ball bearing wheels, which roll on a circular steel track. Each wheel is mounted on two sets of heavy duty combination radial and thrust ball bearings, making the turn table very easy to operate. The outfit can be installed on either a cement or a wooden floor.

From the illustration it will be seen that a large pin fits the center of the cross member joining the two sides and the wheels of the turn table are held in position on the steel track by means of this center pin.

A feature of the device is that it can be easily taken apart and removed to a new location. The first cost is said to be low.

Manufactured by the Richards-Wilcox Manufacturing Co., Aurora, Ill. Prices and literature on request.

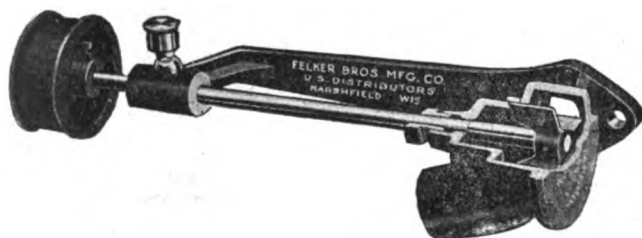
The R-W Pit Ball Bearing Automobile Turn Table No. 463 is of simple construction and particularly suitable for installa-



tion where a wide variety of cars approach the turn table from all directions. The ball bearing rolls operate on a circular steel track on the pit floor and are amply supported by heavy steel I-beams forming the circle and by cross beams equally spaced to the center. The turn table is covered with two-inch planking, made in two sections and hinged through the center, so that access may be had to the rolls for oiling or repairs.

This outfit can be placed either in the garage, in the cement runway in front of the garage, or in a runway at any convenient location about the grounds.

Manufactured by Richards-Wilcox Manufacturing Co., Aurora, Ill. Prices and literature on request.



Perfection Water Circulating Pumps for Ford Cars comprise a unit that is bolted to the side of the engine after the cast elbow that is fastened to the engine block and the short length of hose connecting it to the tube from the radiator have been removed.

The unit consists of a centrifugal pump, encased in a cast housing, equipped with a bronze bushing acting as a bearing that is adjustable for wear. The pump is connected to the pulley by a suitable length of shaft supported at the pulley end by a babbitt bearing, supplied with a grease cup. The pulley face is crowning and the belt is kept in line by a fan pulley which is flanged at the sides. Water connection to the radiator is made by replacing the short length of hose, joining the pump and the water pipe, water being forced directly into the engine water jackets from the pump. It is stated that the water pump can be quickly installed by anyone handy with tools and that it is not necessary to bore new holes in order to fit it to the side of the engine, as the three holes used for fastening the elbow are sufficient for the fastening of the water pump.

Manufactured by the Felker Bros. Manufacturing Co., Marshfield, Wis. Price at dealer's or direct from the factory, \$10.

Bull-Dog Transmission Liners for Ford Cars are made of red elm wood, claimed to be the toughest wood that can be obtained, chemically treated and saturated with a high test fire-resisting oil, which prevents burning or charring. It is guaranteed by the manufacturer to outwear three sets of any other type of liner. The wood liner has 31 vacuum cups, which hold the oil thrown off by the spinning

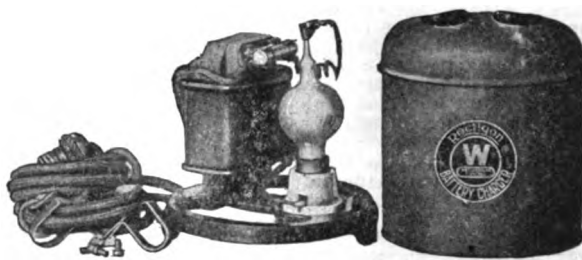
drums of the gearset. As the band is clamped to the drum when applying the brake or the low or reverse speed pedals, the oil held in the vacuum cups thoroughly lubricates the surface between the band



and drum, reducing wear and relieving the heating effect caused by friction between the parts. As the lining is of wood there are no cloth threads to work loose from the lining, to get into the oil and cause further trouble.

Manufactured by the Beardon Co., Inc., Peoria, Ill. Price, per set of three, \$3.

Westinghouse Battery Charging Rectifier is a device recently placed on the market for the use of private car owners who wish to charge their storage batteries from an alternating current circuit. It is provided with a flexible extension cord and plug and can be connected to any house or garage lighting socket. The direct current leads are equipped with special clips for connection to the battery. The connections and operation are, it is



stated, so simple that an inexperienced person can use the outfit without difficulty.

The charger is built rugged and at the same time of simple construction, has no moving parts, uses no oil or grease, and, it is claimed, is not affected by heat or cold. All parts are mounted on a circular cast iron base and are enclosed by a metal cover which is attached to the base by three screws. The top of the cover is shaped into a handle for easy carrying and when in use the outfit rests on three feet cast integral with the base.

The principal parts are a transformer and rectifier bulb. The transformer is mounted vertically on the base while a fuse for protecting the device is located on a small insulated block at the top of the transformer. The bulb is mounted in a socket, which is also mounted on the base in front of the transformer. The insulation of the bulb is simple, being screwed into the socket similar to a lamp and a wire lead clipped on the terminal projecting from the top.

The outfits are so designed as to give rated amperage at normal line voltage to three cells and about two-thirds of this current at normal line voltage to six cells. They are furnished in two sizes, one with a direct current rating of 1½ to 2½ amperes and a larger size with direct current rating of three to six amperes. The approximate net weight of the smaller outfit is 9¼ pounds and of the larger 21 pounds.

Manufactured by the Westinghouse Electric and Manufacturing Co., East Pittsburgh, Pa. Prices and literature on request.

(When Writing to Advertisers, Please Mention the Automobile Journal.)

Serious Situation of Oil Supply

ALL of the oil and gasoline consuming industries in the United States, including automobile manufacturers and users, as well as railroad and steamship lines, are threatened with a serious shortage, unless prompt measures are taken to obviate the pre-emption by other nations of oil fields in foreign countries, particularly to halt the confiscatory legislation and decrees of the Mexican government aimed at American owned and operated companies in that country. Another element which enters into the situation is the continual export in immense quantities to foreign countries of mineral oils produced in American fields.

The latest figures on the world's oil supply, compiled by the United States Geological survey of the Department of the Interior, show that foreign countries are using only half as much petroleum as the United States, but have seven times as much oil left in the ground. These countries are now using about 200,000,000 barrels of oil yearly, but they have resources large enough to last more than 250 years at this rate of consumption. In striking contrast are the production figures for the United States which, at the present rate of more than 400,000,000 barrels a year, has only an 18-year supply. In other words, the United States is using up its own oil supply 14 times as fast as the rest of the world.

"Not counting all oil to be obtained from shales and other recoverable materials by distillation," the report from the Geological Survey states, "recoverable petroleum amounts to as much as 60,000,000,000 barrels. Of this amount 45,000,000,000 barrels may be regarded as oil more or less definitely 'in sight' as shown by actual drilling with successful results. The remainder covers the available oil which it is believed will be found in other regions in which oil seeps, asphalt deposits or favorable geological

conditions point to oil, although no producing wells have yet been drilled. Of this great amount, which is 13 times the oil already taken from the ground in America and about nine times all the petroleum yet produced in the world, 7,000,000,000 barrels only, in round numbers, are believed to be left in the United States and Alaska, the remaining 53,000,000,000 being in foreign countries.

The United States Bureau of Mines has also just issued a warning of the probability of an actual shortage of gasoline before the end of the summer as a result of the disproportionate increase in gasoline production and the number of automobiles in use. With the number of automobiles and trucks now in use, estimated to be 25 per cent. greater than last year, it is stated that gasoline production increased only 11 per cent. in February and 20 per cent. in March.

Exports Far Exceed Imports.

In regard to the factor of exports and imports, the accompanying tables, compiled from the monthly summary of the foreign commerce of the United States, issued by the United States Department of Commerce, shows the exports and imports of crude and refined mineral oil both for the month of February, 1919 and 1920, and also for the eight months ending in February for the past two years.

It will be noted that the total exports of mineral oils exceed the imports for the periods named as follows: February, 1919, 3,448,521 gallons; 1920, 8,880,566 gallons. Eight months ending February, 1919, 497,927,265 gallons; 1920, 74,187,802 gallons. A comparison of these excess exports shows that while the excess for February, 1920, over February, 1919, increased 5,432,045 gallons, the excess for the eight month periods was 423,734,463 gallons less in 1920 than what it was in 1919.

It should be borne in mind in making these comparisons, however, that the ex-

port figures for fuel and gas oil do not include fuel or bunker oil laden on vessels engaged in the foreign trade, as indicated by the foot note in the export table.

A glance at the import table will also show that imports of crude oil from other countries than Mexico were comparatively negligible and that the great bulk of imports to this country in the periods cited came from that country.

Chairman Payne of the United States Shipping board, in a recent letter to President Wilson and Former Secretary of State Lansing, warned them that unless the confiscatory programme of the Mexican government with respect to American owned oil properties was halted, the operation of the American merchant marine would be seriously embarrassed. He pointed out that the United States depended on the Mexican supply to the extent of 40,000,000 barrels for the bunkering of the emergency fleet for the period ending April, 1921.

The effect upon the United States and its industries of any interference with the production and import into the United States of Mexican petroleum is further shown when it is considered that while American produced oil now supplies the major portion of the gasoline and kerosene, as well as all the lubricants used in this country, over 90 per cent. of all the fuel oil used on the Atlantic and Gulf coasts, both for bunkering ships and for industrial purposes, is derived from Mexico, and is being used at the present time at the rate of about 60,000,000 barrels a year (increased from 38,000,000 barrels in 1918).

And unless the rate of production of American petroleum can be greatly increased, which seems doubtful considered in the light of government reports quoted above, America must rely for its increased uses of gasoline on importations, as well as for all increases in the use of fuel oil.

EXPORTS FOR FEBRUARY.

	1919		1920		EIGHT MONTHS ENDING FEBRUARY.			
	Quan.	Value	Quan.	Value	1919	1920	1919	1920
Crude	7,706,912	\$415,461	33,475,701	\$2,146,408	124,806,206	\$7,848,396	239,379,892	\$14,487,427
*Fuel and gas.....	36,948,721	1,848,674	49,556,877	2,389,736	718,455,825	40,751,639	405,025,913	20,693,595
Illuminating	67,338,063	7,566,586	75,679,113	10,355,580	373,891,510	40,344,265	648,514,866	84,739,015
Lubricating	26,882,435	9,308,520	33,230,151	11,227,878	177,565,922	58,048,731	187,791,748	58,727,116
Gasoline	20,752,333	4,835,982	17,909,785	4,252,168	255,668,414	61,327,255	171,432,927	40,272,402
Naphtha, etc.....	6,212,426	1,537,870	14,390,889	3,665,538	104,770,920	28,152,382	80,743,981	21,901,041
Residuum			2,487,225	147,037	54,429	3,470	48,230,342	2,703,997
Total refined.....	158,131,983	25,097,632	193,254,040	32,038,937	1,630,417,020	228,627,742	1,541,739,777	229,037,166
Grand total.....	165,838,895	25,513,093	226,729,741	34,185,340	1,755,223,226	236,476,138	1,781,119,669	243,524,593

*Does not include fuel or bunker oil laden on vessels engaged in the foreign trade, which aggregated during the month and eight months ending in February, as follows: 1919, 682,226 barrels, valued at \$1,531,890; 1920, 1,548,416 barrels, \$3,187,131; eight months ending February, 1918, 3,787,690 barrels, \$5,330,270; 1919, 4,892,060 barrels, \$9,854,167; 1920, 12,267,233 barrels, \$25,191,881.

IMPORTS INTO UNITED STATES.

	FEBRUARY, 1919		1920		EIGHT MONTHS ENDING FEBRUARY			
	Quan.	Value	Quan.	Value	1919	1920	1919	1920
Crude	153,532,320	\$1,799,635	207,478,471	\$2,447,530	1,218,005,601	\$15,515,124	1,657,780,718	\$19,760,749
Mexico	153,532,320	1,799,489	207,476,329	2,447,431	1,217,340,450	15,504,590	1,656,071,639	19,730,862
Other countries.....	3,520	146	2,142	99	665,151	10,534	683,681	11,577
Benzine, naphtha, gasoline...	6,042,410	1,171,342	6,555,990	817,179	10,264,663	1,814,577	13,459,234	1,542,164
Other refined.....	2,811,644	205,908	3,814,714	246,992	29,025,697	2,052,356	35,691,915	2,458,450
Total	162,390,374	3,176,885	217,849,175	3,511,701	1,257,295,961	19,382,057	1,706,931,867	22,761,363

Schweinert President of Schrader Co.

M. CHARLES SCHWEINERT has been elected president of the well known automotive tire accessory concern of A. Schrader's Son, Inc., Brooklyn, N. Y., to succeed Dr. Charles K. Cole, deceased. Mr. Schweinert entered the employ of the Schrader company 34 years ago as an office boy and has been associated with it ever since during its growth from a three-story factory at 32 Rose street, New York City, to its present seven-story fire-proof building occupying the entire block at Atlantic and Vanderbilt avenues, Brooklyn.

The new president has long enjoyed a wide popularity among the men who made and now direct the tire industry of the country. Every improvement brought to the manufacture of tire valves, every saving made in the cost of their manufacture, every widening of their use, has found him an active contributor thereto. It was due to his untiring energy and long foresight that at no time the rapid increase in the manufacture of automobile tires overtook the output of valves to fit these tires.

Dealers in automobile accessories throughout the country are indebted to Mr. Schweinert for the Schrader sales policy, which is based upon a license agreement and which is designed to permit the smallest dealer to reap the same profit through his sales as the dealers in large cities. This has resulted in giving to the Schrader products a nation-wide distribution and has prevented the use of these products in the demoralizing practice of price cutting.

Mr. Schweinert is also credited with having developed the export department of A. Schrader's Son. It was due to his initiative that the company established factories both in Canada and in England. Under his able management the Schrader valve has reached a position where it is recognized as standard for automobile tires the world over.

The Schrader factory in Brooklyn has long been a model of its kind and the many advantages it offers to its employees are due in a great measure to the personal contact maintained at all times between the officers of the company and the workers.

At the time of the preparedness parade, Mr. Schweinert led a regiment of the Rubber Industry division, which was entirely recruited from among the male employees of A. Schrader's Son. During the war he was active in organizing a company of Home Guards in Hudson county, where he resided at the time, and not only commanded this unit with the rank of major, but contributed liberally to its equipment.

He is an ardent sportsman and numbers among the organizations of which he is a member, the New York Athletic and Columbia Yacht clubs, the Society of Automotive Engineers and the Machinery and Akron City clubs.



M. Charles Schweinert, New President A. Schrader's Son, Inc., Brooklyn, N. Y.

NEW CHICAGO PLANT FOR HOOVEN RADIATOR.

The Hooven Radiator Co., Chicago, Ill., announces the perfection of a new tubular radiator designed especially for heavy duty trucks and tractors, the result of more than two years of concentrated study and experimenting by Hooven engineers.

The Hooven Radiator Co. is now occupying its large new factory at 410-420 North Western avenue, Chicago, the erection of which was necessitated by the increased demand for Hooven radiators, which are now standard equipment on several makes of passenger cars, trucks and tractors. As indicative of the wonderful increase in the growth in the business of this company, it may be cited that a year ago the daily output was only 35 radiators, while it is now turning out more than 1000 a day and has a capacity for double that number.

UNIVERSAL TOOL CO. MAINTAINS SERVICE DEPARTMENT.

The Universal Tool Co., Inc., Detroit, Mich., maker of the Universal cylinder re boring tool, main bearing babbitting and boring equipment, brake band mandrels, etc., is maintaining a service department which is devoted exclusively to the interest of users of Universal equipment, wherever located, and all jobbers, dealers and customers are cordially invited to avail themselves of this service, and suggestions for its improvement in any way are always welcomed.

The sales manager is E. H. Herman.

GOODYEAR PLANT FOR BRAZIL.

The Goodyear Tire & Rubber Co., Akron, O., is to establish a branch factory at Rio de Janeiro, Brazil, to have a capacity of about 5000 tires a day, which is expected to be in operation in about 18 months and its operating staff will be recruited from employees at the Akron plant, 3000 of whom will begin at once to learn the Portuguese language.

Niehoff Co. Increasing Production

Paul G. Niehoff & Co., Chicago, Ill., has again found it necessary to extend its production facilities to meet increased demand, and has taken over the plant of the Northern Machine Co. with its entire equipment at 341 East Ohio street, Chicago, and has leased the premises, in addition to its present location at 232-242 East Ohio street.

The Niehoff Co. is going rather extensively into the production of a new line of various kinds of electrical testing instruments and garage equipment for the automotive trade. Some of these instruments are already well known, such as the Defectometer for testing magnetos, Generometer for locating shorts and grounds in the generator and starting motor armatures, Test Kart, a novel and portable outfit which will make a complete test of every known electrical system; Test Bench for the testing of magnetos, generators and starting motors under the same condition they would be subjected on the car, Ford Mag-Charger, for recharging Ford magnets on the car as well as for making tests on other electrical equipment.

ALL-WAY OILER DISTRIBUTED BY FAMASCO CO.

The Famasco Distributing Co., 694 Main street, Buffalo, N. Y., is marketing the new All-Way oiler, which is designed especially to make readily accessible the places that are hard to get at with the ordinary oiler. It has a flexible spout which is claimed to be practically unbreakable and can be bent to reach places that cannot otherwise be properly oiled. At the same time it has a patented cleaning device that keeps the spout from clogging up with grease and dirt. By pressing the spout downward a wire protrudes through the nozzle, making a clean passage for the oil. It is stated that only the very best flexible steel tubing is used, built up on a base of asbestos. The spouts are treated with a solution that positively prevents rusting. It is also said that not only is the All-Way oiler more useful than the ordinary oil can, but is more durable, being built to last a life time.

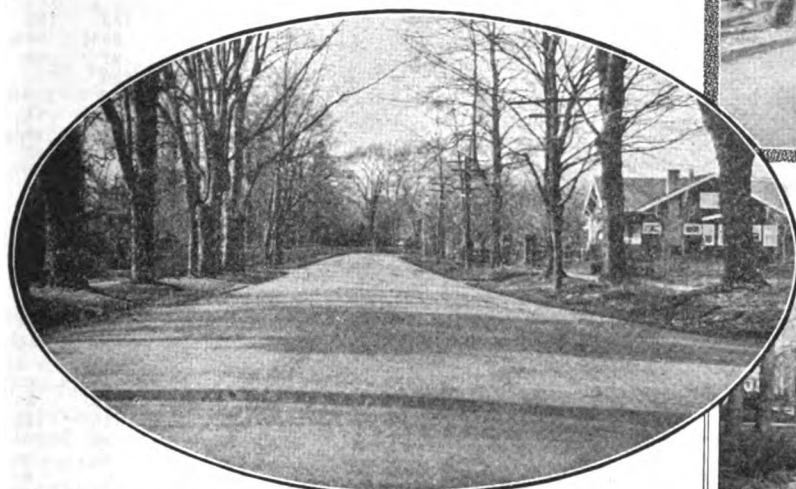
TRUCK TOUR SANCTIONED.

The Milwaukee Automotive Dealers' association has given its approval to the motor truck tour which is to be conducted in Wisconsin, June 21-26, under the auspices of the Milwaukee Sentinel. Alfred Reeke, Nash dealer, and chairman of the transportation committee of the Milwaukee Association of Commerce, has been appointed chairman of the general committee in charge of the tour, and Frank A. Meyer, city sales manager of the Sterling Motor Truck Co., Milwaukee, will act as tour master.

The Mexican export duty on petroleum has been increased from 30 cents to 54 cents a ton.

Tarvia

Preserves Roads
Prevents Dust~



West Broad Street, Stamford, Conn., in front of Hospital. Maintained with "Tarvia-B." This is one of the many streets in Stamford that is ready for traffic at all seasons of the year.



Atlantic Street, Stamford, Conn., constructed with "Tarvia-X" in 1918.



Prospect Street, Stamford, Conn., constructed with "Tarvia-X" penetration method in 1916 and since maintained with "Tarvia-B."

How Stamford's streets are maintained at low cost with Tarvia——

With many miles of waterbound macadam streets, Stamford, Conn., had considerable of a problem in its road maintainance.

How Stamford maintains these streets at low cost is told by Mr. Paul Nash, City Engineer, in a recent letter:—

"About ten years ago the City of Stamford first used 'Tarvia-B' experimentally as a road preservative, and each and every year since that time has depended mainly upon this material for keeping its streets in serviceable condition.

"We have at this time about thirty miles of water-bound macadam roads which are treated annually with one application of 'Tarvia-B' (some needing attention every other year only) using about 60,000 gallons of 'B' or about 2,000 gallons per mile, at a cost of from four to six cents per square yard.

"The condition of these roads at all times of the year is satisfactory and they can all be classed as good roads."

Salvaging old streets with "Tarvia-X"

Stamford also uses the "Tarvia-X" penetration method of resurfacing old macadam roads that are past treating. Mr. Nash's letter goes on to say:—

"Our experience with 'Tarvia-X' penetration work has proved that there is much merit in this type of road even under quite heavy traffic. At a small annual cost, I am convinced that this type of road can be kept in first-class condition almost indefinitely * * * * Our oldest road of this type, now six years in service, is apparently in as good condition and as smooth as when built."

Mr. Nash concludes his letter by saying—

"I want to say a word in commendation of your 'KP' patching material. We could not do without it."

Stamford's experience proves again that there is a grade of Tarvia for practically every road condition.

Special Service Department

This company has a corps of trained engineers and chemists who have given years of study to modern road problems. The advice of these men may be had for the asking by any one interested. If you will write to the nearest office regarding road problems and conditions in your vicinity, the matter will be given prompt attention.

Illustrated booklet telling about the various Tarvia treatments free on request.

New York
Cleveland
Birmingham
Seattle
Youngstown

Chicago
Cincinnati
Kansas City
Peoria
Toledo

Philadelphia
Pittsburgh
Minneapolis
Atlanta
Columbus

The **Barrett** Company

Duluth
Richmond
Toronto

Milwaukee
Lafayette

Dallas
Bangor
Bethlehem

Boston
Detroit
Syracuse
Nashville
Washington
Elizabeth

St. Louis
New Orleans
Salt Lake City
Johnstown
Buffalo

Lebanon
Baltimore

THE BARRETT COMPANY, LIMITED:

Montreal

Toronto

Winnipeg

Vancouver

St. John, N. B.

Halifax, N. S.

Sydney, N. S.

(When Writing to Advertisers, Please Mention the Automobile Journal.)

Stocks on
New York
Exchange

Securities and Crude Rubber Markets

Automobile
and Tire
Quotations

NEW YORK STOCK EXCHANGE.

Week Ended May 1, 1920.

Company	High	Low	Last	Change
Advance Rumely.....	40	35½	36½	—1½
Advance Rumely, pfd.....	65	63½	63½	—3½
Ajax Rubber.....	70	65	66	—2
Allis-Chalmers.....	39½	34½	35½	—3
Allis-Chalmers pfd.....	79½	79	79	—1½
Am. Bosch Magneto.....	113	106	107	—5
Am. LaFrance Fire Eng.....	12½	11½	11½	—¾
Auto Sales.....	11½	11½	11½	—¼
Bethlehem Motors.....	26½	21½	23	—1½
Case, J. I. Co. pfd.....	95	95	95	—½
Chandler Motor.....	151	140½	143	—6½
Emerson-Brantingham.....	21	21	21	—½
Fisher Body.....	132	125½	130	+4½
Fisher Body, pfd.....	103	101	103	—3
Fisk Rubber.....	33½	31½	31½	—1½
General Electric.....	151	145½	145½	—4½
General Motors.....	324	283	295	—3½
General Motors, new.....	32½	28½	29½	—½
General Motors, pfd.....	80	79	79	—1
General Motors, 7% deb.....	84	83½	83½	—½
General Motors, 6% deb.....	72½	71	71	—¼
Goodrich, B. F.....	68	64½	65½	—¼
Goodrich, B. F., pfd.....	92½	91	91½	—¼
Gray & Davis.....	31½	28½	28½	—3
Hendee Mfg.....	40½	35	35	—2
Hupp Motor Car.....	20½	18½	18½	—1½
International Harvester, new.....	129½	118	119½	—7½
International Harvester, new, pfd.....	111	110½	110½	—¼
International Motor Truck.....	120	106	107	—23
International Motor Truck, 1st pfd.....	79½	78	78	—2
International Motor Truck, 2nd pfd.....	67	67	67	—1
Kelly-Springfield Tire.....	118	108	109½	—7½
Kelly-Springfield Tire, 8% pfd.....	101½	100	101½	+2½
Kelsey Wheel.....	73	70	70	—10
Keystone Tire & Rubber.....	34½	30	31	—2½
Lee Rubber & Tire.....	36½	30½	31	—4
Maxwell Motors.....	29½	28	28	—1½
Maxwell Motors, 1st pfd.....	51½	50	50	—3½
Mullins Body.....	42	38½	38½	—2½
Pierce-Arrow.....	64½	54½	56½	—6½
Pierce-Arrow, pfd.....	99½	97	94	—1
Republic Motor Truck.....	43½	42	42	—2
Saxon Motor.....	15½	13	13½	—1½
Stewart-Warner.....	45	41½	42	—1½
Stromberg Carburetor.....	85½	72	73	—8
Studebaker Co.....	113½	106½	108	—2
Studebaker Co., pfd.....	98	97½	97½	—¾
U. S. Rubber.....	104½	97	98½	—3½
U. S. Rubber, 1st pfd.....	109½	108½	108½	—1½
U. S. Steel.....	99½	93½	94½	—1½
U. S. Steel, pfd.....	110½	109½	109½	—1
White Motors.....	59	54½	55½	—2½
Willys-Overland.....	22½	18	18½	—3½
Willys-Overland, pfd.....	84½	81½	81½	—2½

CRUDE RUBBER, NEW YORK PRICES.

	Apr. 5 Cts. Per Lb.	Apr. 21 Cts. Per Lb.
Para—Up-river fine.....	.41½ @ .42	.42 @ —
Up-river medium.....	.40½ @ —	.40½ @ —
Up-river coarse.....	.31½ @ —	.31½ @ —
Caucho ball.....	.33 @ —	.33 @ —
Islands fine.....	.42 @ —	.42 @ —
Islands coarse.....	.21½ @ —	.22 @ —
Cameta.....	.20½ @ —	.21½ @ —
Ceylon—Smoked sheets, ribbed.....	.46 @ —	.44½ @ —
Smoked sheets, plain.....	.45 @ —	.23 @ —
Madeira, fine.....	.44 @ —	.44 @ —
Knapsack.....	— @ —	— @ —
First latex pale crepe.....	.46½ @ —	.45 @ —
Amber crepe.....	Nominal	Nominal
Clean brown crepe.....	— @ —	— @ —
Rio Nunes string.....	— @ —	— @ —
Palembang.....	.13 @ —	.13 @ —
African.....	.33 @ —	.33 @ —
Prime Surinam sheets.....	— @ —	— @ —
Centrals—Corinto prime.....	.32 @ .32½	.32 @ .32½
Esmeralda, prime.....	.32 @ .32½	.32 @ .32½
Balata, sheets.....	Nominal	Nominal
Guayule, wet.....	.27 @ —	.27 @ —
Balata, block, Panama.....	.57 @ —	.57 @ —

AKRON RUBBER PRICES.

	April 1 Bid Asked	April 13 Bid Asked
Amer. R. & T. com.....	88 95	88 91
Amazon Rubber.....	101	101
Firestone, com.....	168 170	183 188
*Firestone, 6 per cent.....	92 93	95½ 96½
Firestone, 7 per cent pfd.....	96½ 97½	97 98
General, com.....	600	600
*General, pfd.....	90½ 100½	100 100½
B. F. Goodrich, com.....	69 71	69 71
B. F. Goodrich, pfd.....	94½ 95½	94½ 95½
Goodyear, com.....	390 400	385 395
*Goodyear, 1st pfd.....	99½ 100	99½ 100
*India Rubber.....	185 200	185 200
Kelly-Springfield.....	128 132	131 133
Mason, com.....	30	30
Mason, pfd.....	75	75
Marathon, com.....	50 55	50 53
*Miller, com.....	188 193	183 188
Mohawk, com.....	335	335
Portage, com.....	96 99	95 98
*Portage, pfd.....	95 88	86
Republic, com.....	3½ 4½	3½ 4
Republic, first pfd.....	65	65
Republic, second pfd.....	35 50	35 40
Rubber Products.....	110 125	110 125
*Star Rubber, com.....	250	200 300
Swinehart, com.....	75 90	80 90
*Swinehart, pfd.....	90	90
Phoenix Rubber, com.....	23	23
Phoenix Rubber, pfd.....	90	90
Standard Tire, com.....	175 200	200 225

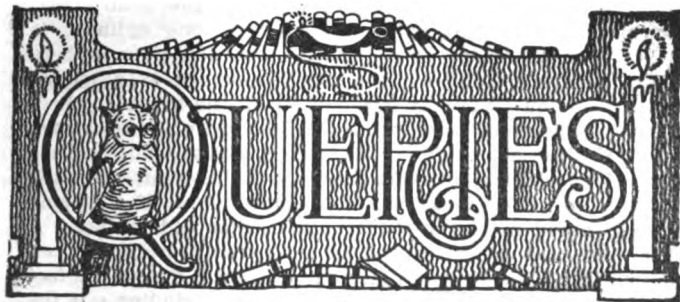
*Ex-dividends.

DIVIDENDS.

Company	Rate	Period	Pay- able	Stock of Record
Auto Car.....	40	Stock	.....	Mar. 31
Cleveland Auto.....	2	.....	Apr. 1	Mar. 21
Eisemann Magneto, pfd.....	\$1.75	Quar.	May 1	Apr. 20
Federal Motor Truck.....	3	Month	Apr. 1	Mar. 24
Fisher Body.....	\$2.50	.....	May 1	Apr. 30
Fisher Body, pfd.....	1½	.....	May 1	Apr. 20
Fisk Rubber.....	75c	Quar.	Apr. 1	Mar. 15
General Motors.....	½	Month	May 1	Apr. 17
General Motors, pfd.....	1½	Quar.	May 1	Apr. 17
Goodrich, B. F., Rubber.....	\$1.50	.....	Aug. 16	Aug. 5
Goodrich, B. F., Rubber, pfd.....	1½	.....	July 1	June 21
Hodgman Rubber, pfd.....	2	Quar.	May 1	Apr. 15
Hood Rubber, pfd.....	1½	Quar.	May 1	Apr. 21
Hupp Motor Car.....	2½	Quar.	May 1	Apr. 15
Int. Harvester, pfd.....	\$1.75	Quar.	June 1	May 1
Kelly-Springfield Tire.....	\$1.00	Quar.	May 1	Apr. 17
Kelly-Springfield Tire.....	3	Stock	May 1	Apr. 17
Kelly-Spring. Tire, 8% pfd.....	\$2.00	Quar.	May 15	May 1
Keystone Tire & Rubber.....	3	Quar.	Apr. 1	Mar. 15
Lee Rubber.....	50c	Quar.	June 1	May 15
Manufactured Rubber, pfd.....	15c	Quar.	May 1	Apr. 27
Martin-Parry.....	50c	Quar.	June 1	May 17
Nash Motors, pfd.....	1½	Quar.	May 1	Apr. 20
National Carbon, pfd.....	2	Quar.	May 1	Apr. 20
Packard Motor Car.....	2½	Quar.	Apr. 30	Apr. 15
Parish & Bingham.....	\$1.00	Quar.	Apr. 20	Apr. 10
Pyrene Manufacturing.....	25c	Quar.	May 1	Apr. 21
Stewart-Warner Speed.....	\$1.00	Quar.	May 15	Apr. 30
Studebaker Corp.....	33 1-3	.....	May 5	Apr. 19
U. S. Rubber.....	2	Quar.	Apr. 30	Apr. 15
U. S. Rubber, 1st pfd.....	2	Quar.	Apr. 30	Apr. 15
Westinghouse Elec. & Mfg.....	2	Quar.	Apr. 30	Apr. 2
West Elec. & Mfg., pfd.....	2	Quar.	Apr. 15	Apr. 2
Willys Corp., 2nd. pfd.....	\$1.75	Quar.	Apr. 1	Mar. 21
Wire Wheel, pfd.....	1	Month	May 10	May 1

MEETINGS.

Company	Date Held	Books Close	Books Open
Ajax Rubber.....	May 18	May 8	.....
Allis-Chalmers.....	May 6	Apr. 15	.....
Fairbanks Co.....	June 10	May 19	.....
General Electric.....	May 11	Apr. 6	May 12
International Harvester.....	May 13	Apr. 23	.....
International Motor Truck.....	June 7	May 14	June 8
Westinghouse Electric.....	June 9	May 22	June 10
White Motor.....	May 1	Apr. 16	.....
Willys-Overland.....	May 11	Apr. 23	May 12



A MYSTERIOUS KNOCK IN THE ENGINE.

(C. J., Newport, R. I.)

Can you tell me what caused this? I had run my engine for a time when all of a sudden I heard it make three or four heavy "bumps," which strongly shook the body. The spark was no more advanced than usual. This had never happened before and it has not happened since.

We cannot. If the noise had been caused by mechanical trouble of any kind there would probably have been some permanent ill effect or most likely a repetition of the same sound. We presume that you are familiar with the noise made by a muffler explosion and by the explosion of a weak mixture in the intake manifold and carburetor. We have also heard of crankcase explosions occurring in four-cycle engines. However, there is good reason to believe that when a large proportion of gasoline has escaped past the piston rings and entered the engine base, there is some chance of its becoming ignited from a blow-by around a loose fitting piston and gas exploding in the engine base. Whether this could have occurred in your case is an interesting question.

TROUBLESOME EXHAUST SMOKE.

(J. H. W., Cincinnati, O.)

My engine has a smoky exhaust, which is especially bad when the engine is idling, but this is not on account of the quality of the oil used. Can it be that the gear pump is supplying too much oil or is the trouble in the piston rings?

The pump can keep the splash basins no more than full, but quite likely this splash level is altogether too high to take care of the idling speeds, although about right under heavy duty conditions. Some engines have means for automatically lowering the splash level at low throttle positions in order to regulate the oil supply. It is almost impossible to prevent smoking during idle operation, for the vacuum is high in the cylinders and oil is almost inevitably drawn up past the rings. Possibly by using a scraper ring with drill holes in each cylinder and drilling the piston through in the bottom of the groove, you could return some of the excess oil to the crankcase, but unless the exhaust is noticeably smoky, when the engine is doing work, it would hardly seem necessary to make any changes.

CARBURETOR OR INTAKE VALVE DEFECTS.

(A. K., Mt. Vernon, Ind.)

I have a 1½-ton truck on which the engine is giving considerable trouble, especially when pulling hard. There is a popping noise that seems to occur in the carburetor hot air connection. This noise does not occur regularly, but at times the engine will pull perfectly, while at other times the trouble will occur while driving on the level, as well as on hills, even when the truck is empty. When this trouble comes I can stop it by raising the choker, and the engine will seemingly regain its power and the popping sound will stop. The carburetor adjustment, the valve timing and the ignition are correct. There is no water in the carburetor bowl or the sediment bulb. The engine is equipped with a Bosch magneto and a Schebler model R carburetor. The truck has been run about 1½ years and was overhauled about six months ago. Kindly advise me what is the trouble.

Test the compression of your engine by turning slowly with the hand crank, bringing one piston at a time up against the compression, and allowing the piston to rock backwards

(When Writing to Advertisers, Please Mention the Automobile Journal.)

METZ Master Six

The car of the Year

A New England Product

Honest through and through

\$1895 F. O. B. factory FULLY
EQUIPPED

We are now extending our agency list
Information at request

METZ SALES CORPORATION
BOSTON, MASS.



Monthly

20c the Copy

\$2 the Year

A Tractor Journal
devoted to the
tractor industry and trade

Published by

The Automobile Journal Publishing Company
PAWTUCKET, RHODE ISLAND

The Accessory and Garage Journal

\$2 the Year, 20 Cents the Single Copy.

The only American publication devoted exclusively to the Power Vehicle and Allied Industries and Trades. A guaranteed circulation of 25,000 copies to trade interests only.

Address all communications to the

TIMES BUILDING

Pawtucket

Rhode Island



**All That Its
Name Implies—**

THE HEIGHT OF PERFECTION

You cannot secure more efficient and economical carburetion than by the Zenith. Simplest to adjust, and once adjusted stays adjusted.

Known the world over as the

ZENITH OF CARBURETOR EFFICIENCY

A long list of American builders of cars, trucks and aeroplanes believe this simple, plain tube device to be the best insurance for permanent carburetor satisfaction.

Zenith Carburetor Co.

New York Detroit, U. S. A. Chicago



50% additional wear built into your tires after they have reached the point when they are usually discarded. Save what otherwise would be wasted. This is a rebuilding plant operated by skilled workmen, the product of ten years experience building tires at the



Firestone and Goodrich factories.

We absolutely guarantee from three to thirty-five hundred more miles after our work is finished.

Brown Retread Tire Company

70 Clarendon St. Boston



Giant Searchlight

The highest quality lowest priced lamp produced.

LIST PRICE With Mirror.....\$6.00
Without Mirror.....\$5.00

CULVER-STEARN'S MFG. CO.

Worcester, Mass.
Detroit, Mich.

The Automobile Journal

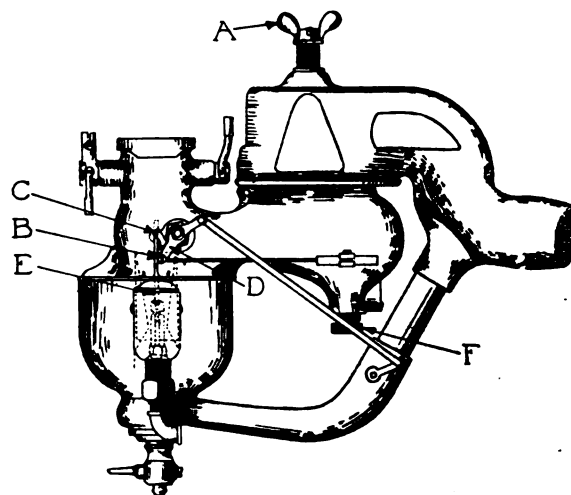
A QUALITY MAGAZINE, WITH PRESTIGE AND CIRCULATION THAT BRINGS RESULTS TO ADVERTISERS

TIMES BUILDING :: PAWTUCKET, R. I.

and forwards against the compression with the hand crank. This method of testing will show whether one cylinder is weaker than the other three. Also listen and note if there occurs a hissing sound as the piston is turned over against the compression. This may occur either at the threads, where the plug is screwed into the top of the cylinder, or at the base of the petcocks. Squirt oil from a cup around the base of the plugs and the cocks and see if bubbles occur when the piston is forced over against the compression. If a hissing sound is noted in the intake manifold, this will indicate a weak valve, and will be proved by weak compression of a certain cylinder. We suspect that your trouble is due to the fact that one or more of the intake valves need grinding. If the compression is good on all four cylinders and hissing sounds are not heard, showing that the compression is perfect, then your trouble is undoubtedly in the carburetor adjustment. This, however, should always be left till the last, till other components have been proved to be working properly.

The adjustments of the Schebler model R carburetor are simple and are as follows:

When the carburetor is installed, see that lever "B" is attached to dash control, so that when boss "D" of lever "B" is against stop "C," the dash control plunger is all the way in. This is the proper running position for lever "B."



To adjust the carburetor turn air valve wing nut "A" clockwise, or to the right, until it stops; then turn to the left, or anti-clockwise, one complete turn.

To start engine, open throttle about one-eighth or one-quarter way. When engine is started, let it run until warmed, then turn air valve wing nut "A" to left, or anti-clockwise, until engine hits perfectly on all cylinders. Advance spark three-quarters way on the quadrant; if the engine backfires on quick acceleration, turn adjusting screw "F" up (which increases tension on air valve spring) until acceleration is satisfactory.

Explanation.

Turning air valve wing nut "A" to right, or clockwise, lifts needle "E" out of nozzle and enriches the mixture; turning to the left, or anti-clockwise, lowers the needle into nozzle and makes the mixture lean.

When engine is cold or the car has been standing, pull dash plunger control out, which lifts the needle "E" out of gasoline nozzle and makes a rich mixture for starting; also locks the air valve. As the engine warms up, push plunger in to obtain best running conditions until engine has reached normal temperature. When this temperature has been attained the plunger should be entirely in.

For best economy and power, the Schebler Co. recommends that the slow speed adjustment be made as lean as possible.

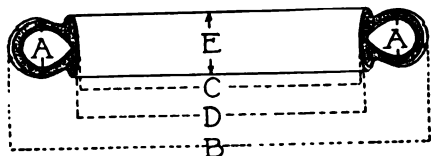
From the above instructions for setting the Schebler model R carburetor, it would seem that your air adjustment might be either too light for the season or else you were running with too lean a mixture of gas. Try checking up your adjustments according to the instructions and the accompanying illustration.

PNEUMATIC TIRE AND RIM SIZES.

(G. B. T., New York City.)

For several years I have read many books, magazines and articles on automobiles and I cannot remember of seeing any article that told me when I picked up a rim how I could measure it to find out what sized shoe it would take to properly fit it. Hope that you will publish an article and diagram showing how to measure the rim so that one can tell the size of tire required, for the benefit of myself and many other motorists who, I feel sure, are interested in the same subject.

The diagram shown is self-explanatory and briefly tells how to measure the rim either between the inner sides at "C" or the bottom of the channels at "D." "A" shows the cross section of the tire, while "B" is the outer circumference. The accompanying table under the headings "A," "B," "C," "D" and "E" gives the tire sizes. "A" shows the diameter of the tire in inches; "B" the outer circumference in inches; "C" the inner diameter of the rim in inches; "D" the



diameter from channel to channel of the rim, while "E" gives the cross section of the rim in inches according to the size of the tire.

Regular Tire and Rim Sizes.

A Inches	B Inches	C Inches	D Inches	E Inches
3	30	23 3/4	24	1 1/4
3 1/2	30	22 11/16	23	1 1/4
3 3/4	32	24 11/16	25	1 1/4
4	31	22 11/16	23	1 1/2
4	32	23 11/16	24	2
4	33	24 11/16	25	1 1/2
4	34	25 11/16	26	2
4 1/2	32	22 11/16	23	2 1/4
4 1/2	33	23 11/16	24	2
4 1/2	34	24 11/16	25	2 1/4
4 1/2	35	25 11/16	26	2
4 1/2	36	26 11/16	27	2 1/4
5	33	22 11/16	23	2 1/4
5	35	24 11/16	25	2 1/4
5	37	26 11/16	27	2 1/4
6	36			
7	38			
8	40			

It is the practise among rim and felloe band manufacturers making demountable rims, to plainly stamp with a steel stamp the tire size required to fit their rims and also on the felloe bands that are fitted to the wooden rim of the wheel. These figures correspond so that from either it is possible to note at a glance what size tire is required for a certain rim and the proper felloe band required to take the rim.

RESEATING FORD ENGINE VALVES.

(C. N. B., Wappengers Falls, N. Y.)

1. In fitting new valves in a Ford engine is it necessary to regrind them? Should push rods be new also?
2. What make of truck (1 1/2 tons capacity) would you recommend as being best designed throughout? My ideas suggest a Republic.
3. We have on our Ford engine a fuel economizer, connected between the carburetor and the intake manifold, equipped with a ball valve, that may be adjusted for light or heavy tension. Is it possible to so connect this fuel economizer with the overflow of the radiator so as to supply the engine with moist air?

1. In replacing old valves with new in the Ford engine, it is always necessary to regrind them to the valve seat, as there are usually irregularities in the valve face that will have to be removed before the valve will fit the seat gas tight. If the seat is cut deeply it may be necessary to use a

(When Writing to Advertisers, Please Mention the Automobile Journal.)

Makes Motoring a Pleasure

Polarine Oil keeps your motor running smoothly and quietly. It keeps the engine free from knocks, racking vibration and grinding friction wear. Makes motoring pleasanter—and less expensive, too.

For transmission and differential lubrication, use *Polarine Gear Oil*.

Get them both where you get clean, powerful Socony gasoline.

Look for the red, white and blue Socony sign.

Standard Oil Co. of N.Y.

(Principal Stations)
New York Albany Buffalo Boston



Polarine



Cuts The High Cost of Motoring

LUBRICATE gears and bearings with **NON-FLUID OIL** and you will give them better protection from frictional wear, reduce your repair bills and get better lubrication at less cost per month.

Use "**K-00 SPECIAL**" for Gears

"**K-000**" for bearings

At your dealers.
In the orange can.

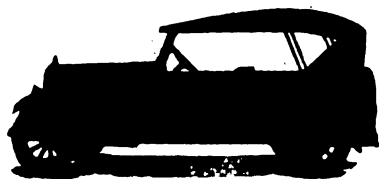
New York & New Jersey Lubricant Co.

401 BROADWAY, NEW YORK



5 YEARS' CONTRACTS

Write for territory and information on
passenger cars and trucks.
Separate contracts.



Winther "Six"

WINTHER MOTOR SALES CORP.
KENOSHA, WIS.

KEEP GEARS YOUNG

A car is as old as its gears. Worn gears rob a car of pep and power.

DIXON'S
GRAPHITE
Transmission and Differential
LUBRICANT

helps to postpone the day when your car just drags along. It saves "gas"—reduces upkeep and makes smoother and easier miles.

Write for Booklet No. 210-G.

Made in Jersey City, N. J. by the
JOSEPH DIXON CRUCIBLE COMPANY
Established 1827



reseating tool and cut down the edges of the seat, so that the new valve may seat perfectly. It is not necessary to renew the push rods.

2. Around certain prices there will be found many trucks that are thoroughly reliable and efficient and there is very little difference between them as regards their makeup, etc. The best way to get the information you desire is to interview one or more owners of the type of truck which you favor and ascertain what kind of service the truck is rendering in their work. In this way you will be more likely to get an unbiased opinion, first hand, and one that you can rely upon. Usually if a truck is giving satisfactory service in a line of work similar to your own, it can be depended on to handle your work equally as well.

3. You can connect the fuel economizer on your engine with the overflow of the radiator if you wish, but we would suggest that a better method would be to fit a petcock in the top of the radiator at the rear of the tank, and lead a copper tube from this petcock down to the economizer. In this way you will not hinder the overflow from performing its work, and you will be using hot steam from the top of the radiator instead of water, which will give better results. Or you can mount a water container in some convenient place and connect it by a petcock and tubing to the economizer, the petcock being used to shut off the flow of water when not needed.

We would advise, rather than to use the economizer for this purpose, to fit a connection into the intake manifold at the "Y" or at the point where the manifold branches to go to the cylinders. In this way the water will be taken in nearer the point at which it is to be used and there will be less chance of its running back into the carburetor and causing trouble. Such devices can be purchased ready to install at a very nominal figure, and it takes only a few minutes time to fit them in place.

These devices have been shown in the New Accessory columns of the Automobile Journal under the name of humidifiers and vaporizing devices. The list given below will put you in touch with the manufacturers, or you may be able to purchase one from a near-by supply house.

The Esta Co., 107 Massachusetts avenue, Boston, Mass., "Esta Water Auxiliator."

Hastings Manufacturing Co., Hastings, Mich., "Hastings Decarbo" steam decarbonizers.

S. & H. Manufacturing Co., 406 Palace Building, Minneapolis, Minn., "S. & H."

The R. S. Whitney Manufacturing Co., 74 Nichols street, Lewiston, Me.

Workrite Manufacturing Co., 5606 Euclid avenue, Cleveland, O., "Workrite."

CARBURETOR DEFECT.

(C. W. K., Harrisville, R. I.)

My car has been driven about 700 miles. In starting to climb a hill my engine makes a sucking sound and does not give the proper amount of power. It seems as though the valve springs were weak and I am thinking of replacing them. What do you advise?

We are of the opinion that the defect is not in your engine valve springs, as you suggest, as the car is comparatively new, and defects of this nature would not be likely to show for the short mileage you have driven. On engines using certain makes of carburetors this sucking sound is more pronounced when ascending a hill than it is on the level, as it is naturally drawing more fuel and necessarily a greater amount of air through the carburetor, and the noise you speak of could easily be made by the inrushing air working against the air shutter and its spring. That your car seems to lack power can be very easily explained by the fact that probably your carburetor has not been changed at the air adjustment for the colder atmospheric conditions. Turning down this air adjustment will decrease the amount of air taken in and will result in better power of the engine. Possibly it may be necessary to open the needle valve slightly, if the carburetor is provided with one, or to change the spray nozzle to a larger size if equipped with spray nozzle.

(When Writing to Advertisers, Please Mention the Automobile Journal.)

The valve springs may be tested with the engine running, by inserting a screw driver between the coils of the springs, one at a time, spreading the coils slightly and noting whether a difference is shown in the operation of the engine. Putting more tension on the spring by this method will cause the engine to pick up if the spring is weak.

SERVICE STATION FOR A SMALL TOWN, AUTOMOBILES AND TRACTORS.

(J. T. B., Lancaster, Pa.)

What tools and machinery will be necessary for equipping and operating a first class service station in a small town where most of the work will consist of automobile and some tractor repairing? Am a machinist by trade and this work I am attending to myself, hiring two or three men for the repair work. Blacksmithing and welding will also be handled by myself. Will have a building large enough for eight or 10 cars. Many shops that I have examined where they repair automobiles do not seem to be equipped as I should imagine that they should be, many of them having only a vise, hammer and a chisel with which to do the work. What correspondence school would you recommend along with this work?

The illustration shown is considered by the two proprietors who operate it a very good layout for a service station designed for the class of work that you mention. The equipment is exceptionally good and is planned in such a manner that the different operations are grouped so that much time is saved in carrying out certain lines of repair work. Three cars can be worked on at the same time, as three pits are provided in the rear, next to the work bench. Good lighting facilities are provided from four windows in the rear and two at each side. All small tools belonging to the workers are located in slide drawers under the bench, which can be locked if desired. The engine stands are two in number and are shown stored at the left of the pits and can be moved to any point desired, as they are mounted on rollers. The machine shop is located as a unit at the right, the line shaft running parallel with the side of the building, and is driven either by an electric motor if electric current is available, or by a gasoline engine. The electric motor is located on a shelf, supported by brackets, in the corner of the room and near the end of the cross beams. The gasoline engine is set on the floor in the corner and may be mounted either on skids, or if a cement floor is used, may be fastened to bolts set in the cement. The floor is cement and is level with the exception of the wash stand, which should have a slight slope to the drain at the center.

The machinery equipment consists of a five horsepower electric motor or an eight or 10-horsepower gasoline engine, power cut off saw, emery grinder, mounted on a standard and carrying two wheels, one coarse and the other fine; 15-inch lathe, vertical drill and milling machine, 21-inch face plate; air compressor and tank, belt driven or driven by an independent electric motor, and blacksmith forge, hand or power driven. In the room with the forge is located the welding outfit and battery charger, also belt or electric driven for charging storage batteries. As you will receive many calls for this kind of work you should be equipped to handle it. The office and stock room are located in the front of the station at the right, the stock room adjoining the office, while in the rear are located the shop and private toilets. A work bench is provided in the welding and blacksmith room and this is provided with a vise and the necessary tools for this class of work.

The gasoline pump, oil barrels and grease supply are placed in the front left corner of the station, as it is at this point that the owner will receive most of the calls for these items. Air for free air service is piped from the pressure tank to an air cock and hose connection near the door. The gasoline pump can be located outside the building if desired, the tank being placed underground. Sliding doors are fitted at the doorway into the station and these slide inside as shown. The reason for placing the gasoline pump inside in this layout is that the station is located in the city where space is at a premium, and it is desirable to have all the units of the garage inside. A show window is provided in the office, while space is left at the rear for storing accessories. There

(When Writing to Advertisers, Please Mention the Automobile Journal.)



PREFERRED THE WORLD OVER

EVERY Ford owner acknowledges the necessity of a better cooling system.

Every Ford owner who has used a National Zig-Zag radiator will tell you emphatically that it eliminates his radiator troubles.

The reason is that the Zig-Zag principle affords greater water space and more cooling surface.

It means a smoother running engine. And it improves the look of the car decidedly.

That is why the National Zig-Zag is preferred by thousands of Ford owners the world over as a vital addition to Ford efficiency.

Let us put you in touch with the nearest dealer.

NATIONAL CAN COMPANY

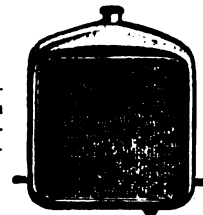
Detroit

Radiator Division

Michigan

DEALERS

We are now in a position to offer you an attractive agency proposition. Full information upon request.



PRICES

\$28.00 finished
Black Enamel. \$30.00
finished in Nickel
F. O. B. Detroit
Shipping weight complete 35 pounds.

NATIONAL Zig-Zag RADIATOR

V. A. NIELSEN CO.

708 Beacon Street

Boston, Mass.

We Do Any Electrical Auto-Repairs

*Immediate Return Reliable Work
Absolute Guarantee*

Factory Depot for
Connecticut Ignition
Dealers' Parts List Ready

N. E. Distributors
Stokes Carburetor
Agents Wanted

MAY WE DO YOUR WORK

NEW DEPARTURE BALL BEARINGS

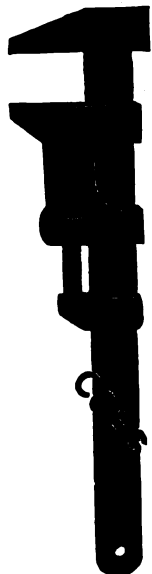


*Strength
Stamina
Service*



The New Departure Manufacturing Co., Bristol, Conn.
Conrad Patent Licensees

COES *The Standard WRENCH*



WRENCHES that are made for the hardest service. They do not break but grip and hold and their efficiency never lessens.

Economy tools as they last longer, give better service and never become useless through wear.

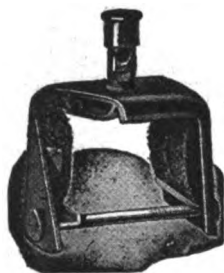
Utility wrenches of the highest order for car owners and repairers as they can be used in compact places and once set hold like a vise.

*The Best Wrench
The Cheapest*

All dealers carry in stock the exact size to meet your need. They recommend Coes Wrenches as all good dealers have for more than fifty years.

COES WRENCH COMPANY
WORCESTER, MASS.

ENJOY SMOOTH RIDING



by keeping your springs lubricated. Brown Oilers automatically filter oil between spring leaves, eliminate rust, stop squeaks and give you solid comfort.

Easily applied. Ask your dealer. Set of 8 oilers, \$10. Money back guarantee.

BROWN SPRING OILER CO.,
6913 Carnegie Ave., Cleveland, O.

PAIGE
The Most Beautiful Car in America

A complete line
of touring and
enclosed models.

Write for Literature.

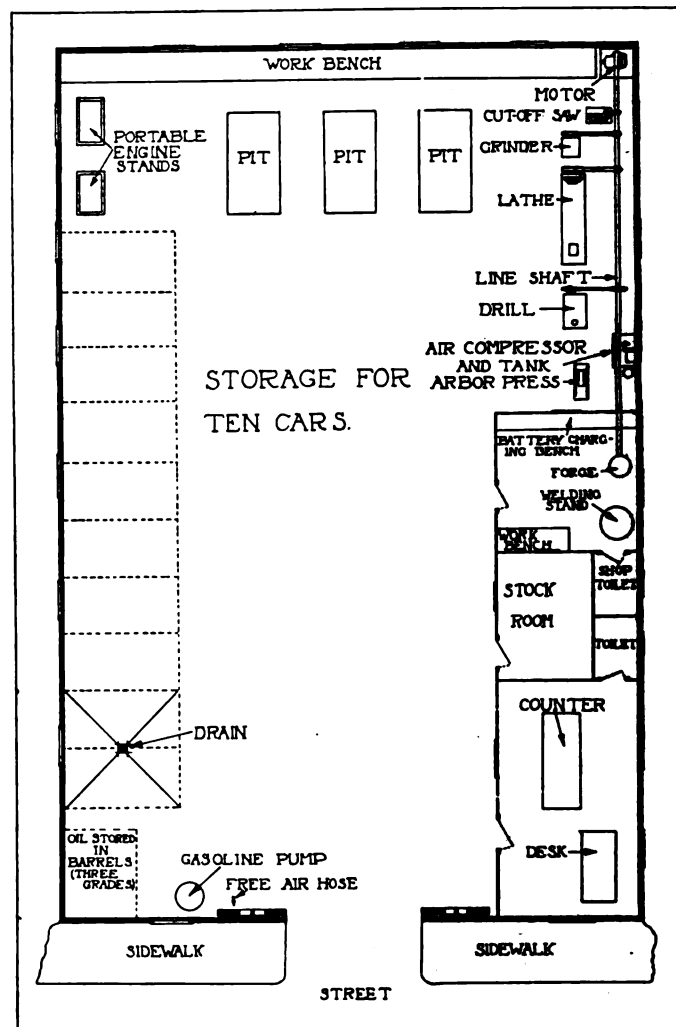
Paige-Detroit Motor Car Co.

DETROIT, MICH.

is a cellar under the building in which bulk stock can be stored and where also is placed the heater for the station. This is not shown, although the entrance to it is through the office and a door at the back next to the stock room partition.

The workman's bench at the rear is fitted with three or four sizes of vises, while other tools that the workmen require frequently are fastened or held to the walls near the bench with clips or fasteners. Many of the more costly tools are kept in the stock room and issued to the repairers as called for, taking in exchange a ticket or brass check, which is hung on the nail or shelf from which the tool was taken. When not in use the pits are covered with planking, presenting a smooth surface over which cars can be driven, increasing the storage capacity of the station.

In purchasing small tools for the station, you had better go to a good tool and machinery supply house in either Philadelphia or New York, or else send and get catalogues and from them pick out the tools that you require at the start.



adding to them as the business increases. It is much the better plan to start small and increase as business warrants.

With some modifications to suit your local conditions we believe that the above plan will meet with your approval and will give you an idea of what is required in an up-to-date service station doing a straight repair business.

As to your question relating to correspondence schools, although there are many schools that are doing commendable work in this field, still we believe that a man can post himself adequately and at less cost, by purchasing and reading books published by standard writers along automobile and tractor lines, written by men who have themselves done practical work on automobiles.

Many of these books are advertised in the publications of the Automobile Journal Publishing Co., and reviews are made from time to time as new books are issued. A close study of books and articles published from time to time should give you the required insight into the work.

(When Writing to Advertisers, Please Mention the Automobile Journal)

We Want Dealers

We want financially responsible men in towns where the Huffman Six is not yet represented—"live wires" who will take the time to investigate us and who are willing that we should investigate them. Huffman Brothers Motor Co. has been in existence three years and is prepared to show any responsible dealer that the Huffman Dealer Proposition is one of the most attractive in America today.



The Huffman Six is a car of that type which is most sought for today by the purchaser of "a family car." Read the specifications below and you will see why we say that the Huffman Six is "the car that sells itself." Then if you want to "tie up" with a factory organization that will give you the support and co-operation you have a right to expect, wire or write us at once.

SPECIFICATIONS

Motor—Continental 6-cylinder, 3½x4½.
Transmission—Covert—three speed selective type integral with motor.
Clutch—Borg & Beck 10 inch, 10 spline.
Lubrication—Combined force feed and splash.
Cooling—Centrifugal pump.
Springs—Front, 37", semi-elliptic Clemens. steel bushings fitted with oil cups and

wicks; Rear, 56", bottom leaf special alloy steel.
Axles—Front I-beam; rear full floating and spiral gear driven.
Tires—32"x4" straight side, non-skid on rear.
Wheelbase—120 inches.
Carburetor—Stromberg.

Dyneto—2-unit, 6-volt, starting and lighting system. Willard battery. Connecticut ignition.
Propeller Shaft Universals—Hardy flexible discs eliminate universal joint trouble and require no lubrication.
Weight—2,680 pounds.
Price—\$1995—f. o. b. Elkhart, Indiana.

ADDITIONAL REFINEMENTS THAT PROVE THE CAR'S COMPLETENESS.

Regular tailor made, actual one-man top.
Genuine leather straight plaited upholstery.
Inlaid linoleum covered running boards and floor boards.
Stewart-Warner speedometer.
Accurate gasoline gauge on tank.
12-ft. extension trouble lamp cord from in-

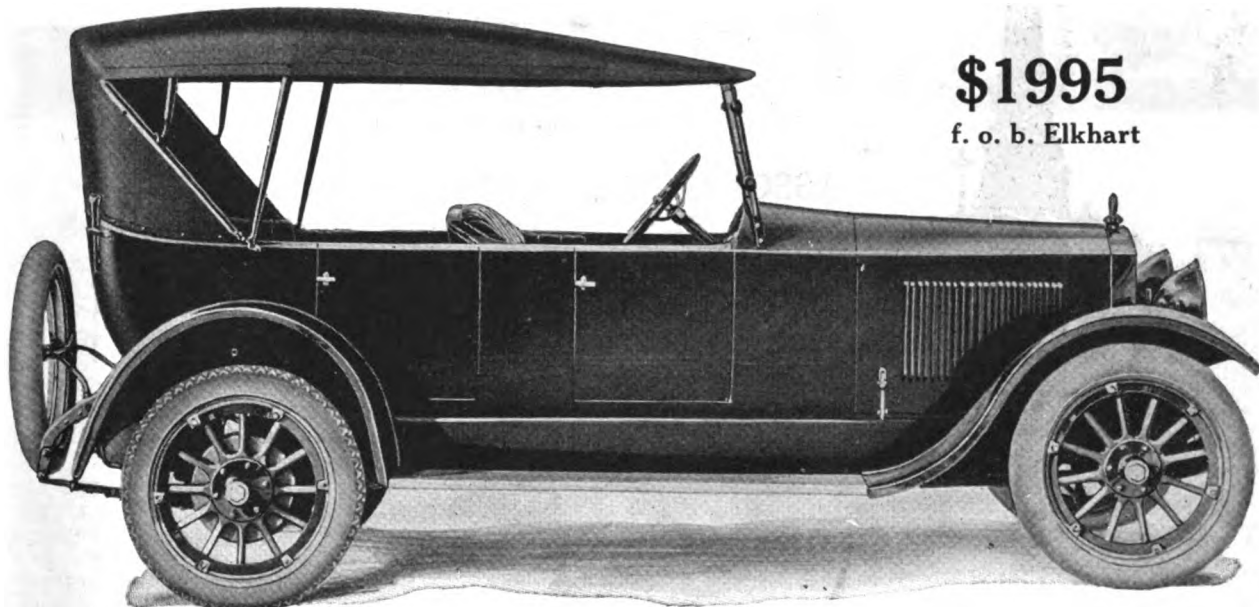
strument board light.
Three-way tonneau light.
Rigid tire carrier on rear.
Automatic shut-off ignition switch.
Double ventilating windshield.
Robe rail on back of front seat.
Large pocket in front doors and rear of

front seat.
Complete set of good tools, jack and pump.
Motometer on radiator cap.
10x24" plate glass rear curtain window.
Side curtains open with doors.
Colors—Foch Gray, Victory Blue, Huffman Maroon.

Huffman Brothers Motor Co.

Factory, Elkhart, Indiana
Makers of the Huffman Truck

Showroom
2425 Michigan Ave.
Chicago



\$1995

f. o. b. Elkhart

(When Writing to Advertisers, Please Mention the Automobile Journal.)

Business Emergencies Face You Daily

but your brain is full of little pigeon-holes in which you can file away thoughts, ideas, impressions. When you are faced by a business crisis, a difficult problem, at once you can turn to find the required data in your mental pigeon-holes.

The wise and provident man finds helpful material there, for continually he is replacing old, worn ideas with new ones. The



Sixteenth Annual Convention of the Associated Advertising Clubs of the World



Indianapolis, June 6—10

will give every business man and woman an opportunity to file away priceless memorandums, selected from addresses and discussions by the most successful advertisers.

You will come into face-to-face contact with alert business men who are making profitable use of the power of advertising and you will find at the Indianapolis Convention an exhibit of advertising of the kinds that pay best—such an exhibit as will help make your advertising pay better.

There will be exhibited complete advertising campaigns, representing ideas which have cost thousands of dollars and months of time to originate.

Years of successful advertising experience will be concentrated in this exhibit.

Again this year, the bars are down—and you do not have to be a member to attend.

Keep in step with the increasing army of better advertisers. Write or wire for further information or hotel reservations.

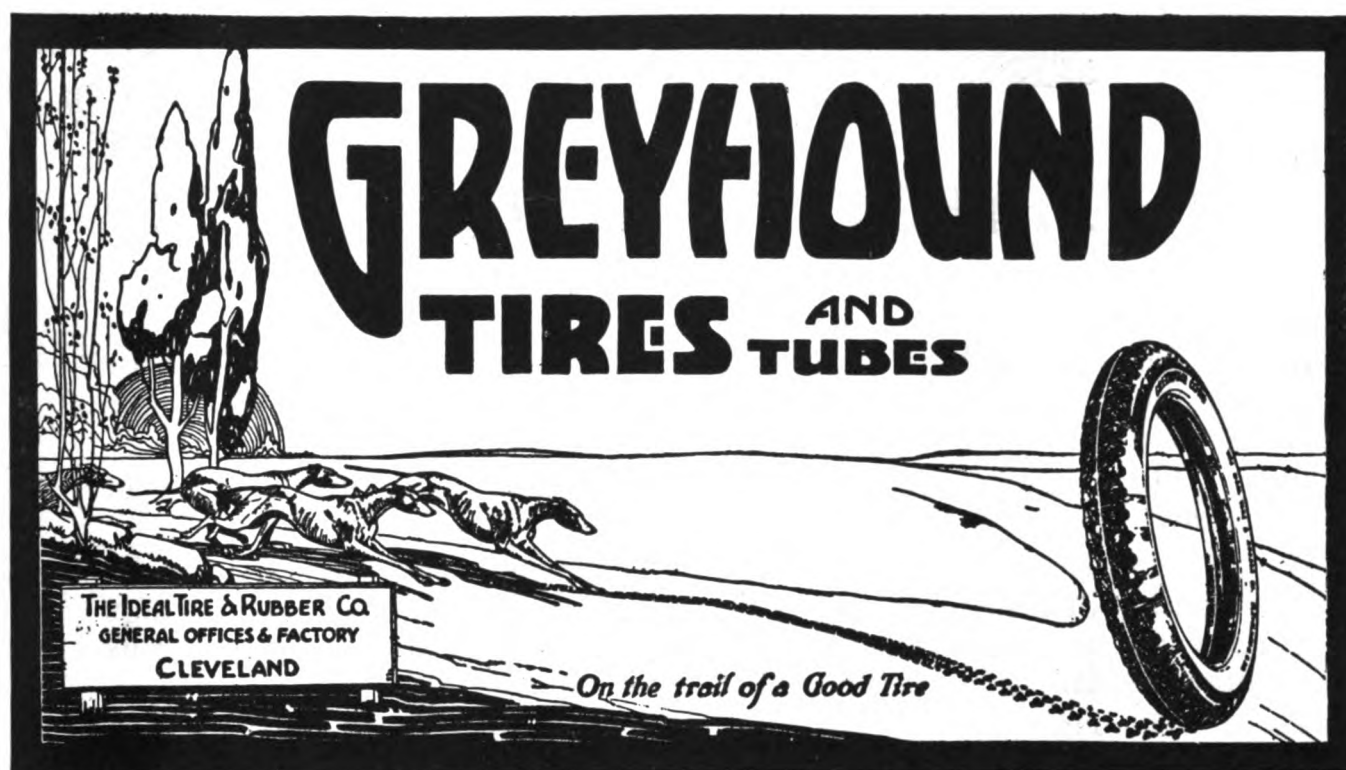
ASSOCIATED ADVERTISING CLUBS

110 West 40th Street, New York City

“ADVERTISING, HOW AND NOW”



INDIANAPOLIS

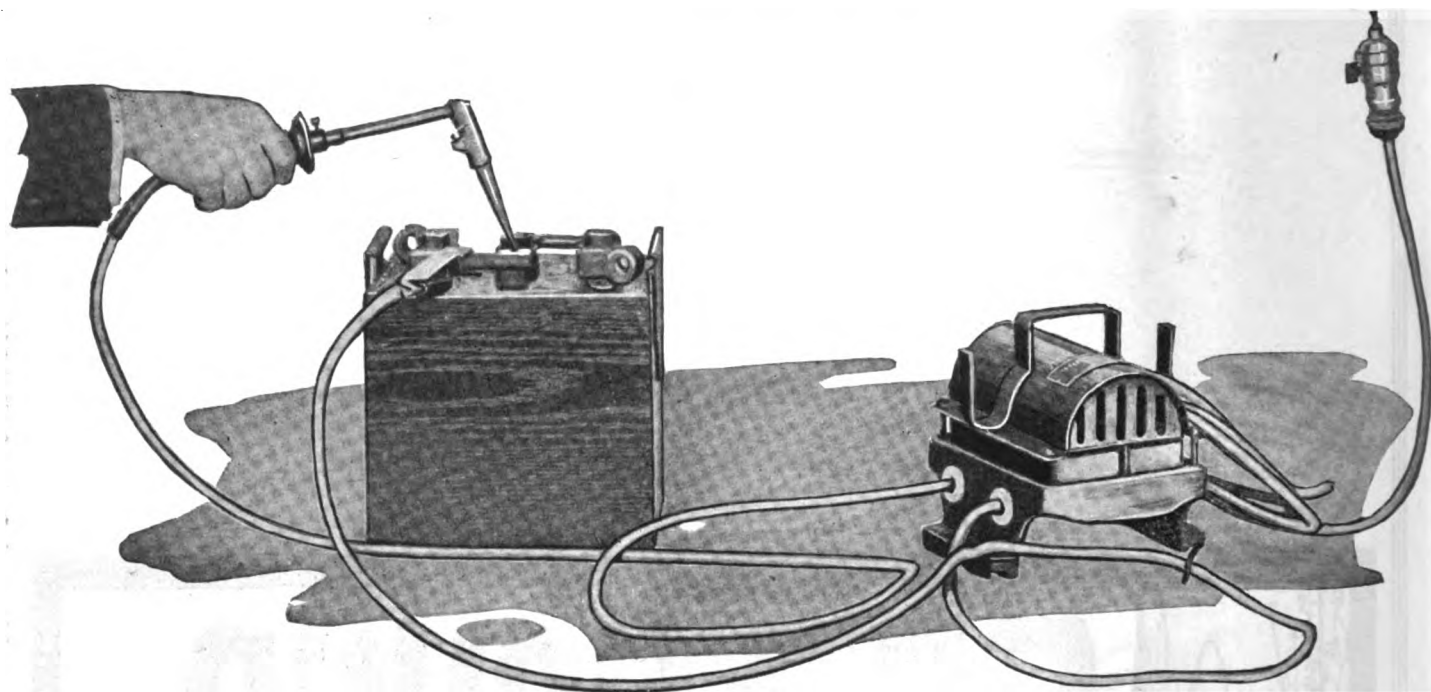


GREYHOUND
TIRES AND TUBES

THE IDEAL TIRE & RUBBER CO.
GENERAL OFFICES & FACTORY
CLEVELAND

On the trail of a Good Tire

The illustration depicts a greyhound dog running across a field towards a large tire on the right. In the background, there are stylized trees and a fence. A sign on the left identifies the company as 'THE IDEAL TIRE & RUBBER CO. GENERAL OFFICES & FACTORY CLEVELAND'. The slogan 'On the trail of a Good Tire' is written at the bottom of the scene.



THE PYROTIP ELECTRIC BURNER IT MELTS LEAD

The electric burner can be used for storage battery repairs or any shop jobs which require lead burning formerly done with a gas flame.

Heat may be applied exactly where needed with the hot carbon points.

Performs all operations quickly and economically whether in the assembly or disassembly of storage batteries in the soldering of lugs on cable or their removal. Concentration of heat at the carbon points prevents damage to cable insulation of cars.

Pyrotip equipment consists of a transformer and two cables, one terminating in a carbon pointed tool to apply and localize the heat and the other in a clamp for fastening to the work to complete the circuit.

Current is supplied to the transformer through an attachment cord and plug from the ordinary lamp socket. Pyrotip operation on any alternating current circuit.

The entire outfit is portable, weighing only 25 pounds.

It is a proven fact that these compact, simple, efficient electric burners greatly improve working conditions as well as save time, fuel and money.



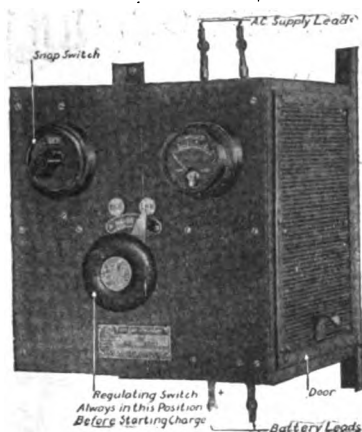
Automobile Division

PETTINGELL-ANDREWS COMPANY

100 Brookline Ave.

Boston, Mass.

(When Writing to Advertisers, Please Mention the Automobile Journal.)



Type for Public Garage.

Tungar

BATTERY CHARGER

An Ideal Battery Charger for Alternating Current

The 6 amp., 75 volt Tungar Rectifier will charge any combination of 3, 4, 5, 6 up to 30 cells at 6 or 7 amperes or less from alternating current.

This is a practical device demonstrated by actual service, it equips the garage for efficient battery charging at a much lower cost than any other reliable device of similar capacity.

Attached to the wall, the Tungar takes up no floor space. It uses alternating current at a cost of but six cents an hour for ten 3-cell batteries. It is self-starting, requiring no attendant.

The smaller outfit (5/3 amp. 7.5/15 volts and 2 amp. 7.5 volts) is designed for battery charging in the private garage. This outfit has the same advantages as the larger set.

Write for the following bulletins giving full information:

- | | |
|----------------|-----------------------------|
| Bulletin 63951 | } For the large outfit. |
| Booklet B-3487 | |
| Booklet | For the private garage set. |
| Booklet B-3529 | Four battery type. |



Automobile Division

PETTINGELL - ANDREWS COMPANY

100 Brookline Ave.

Boston, Mass.

TRADE MARK
EAGLEINE
REGISTERED
**MOTOR
OILS**



EAGLEINE OILS

are unequalled for motor lubrication, freer from carbon, economical because they protect the motor against mechanical wear, and the quantity required is comparatively small.

These are the claims of thousands of motorists,—some with years of experience, who want full value, and more who know the value of high grade lubricants, and who know when they obtain satisfaction.

EAGLEINE QUALITY IS INSURED TO YOU

A grade for every type of motor. It is sold in sealed containers.

*Let us send you our new book and chart.
It is free at request.*

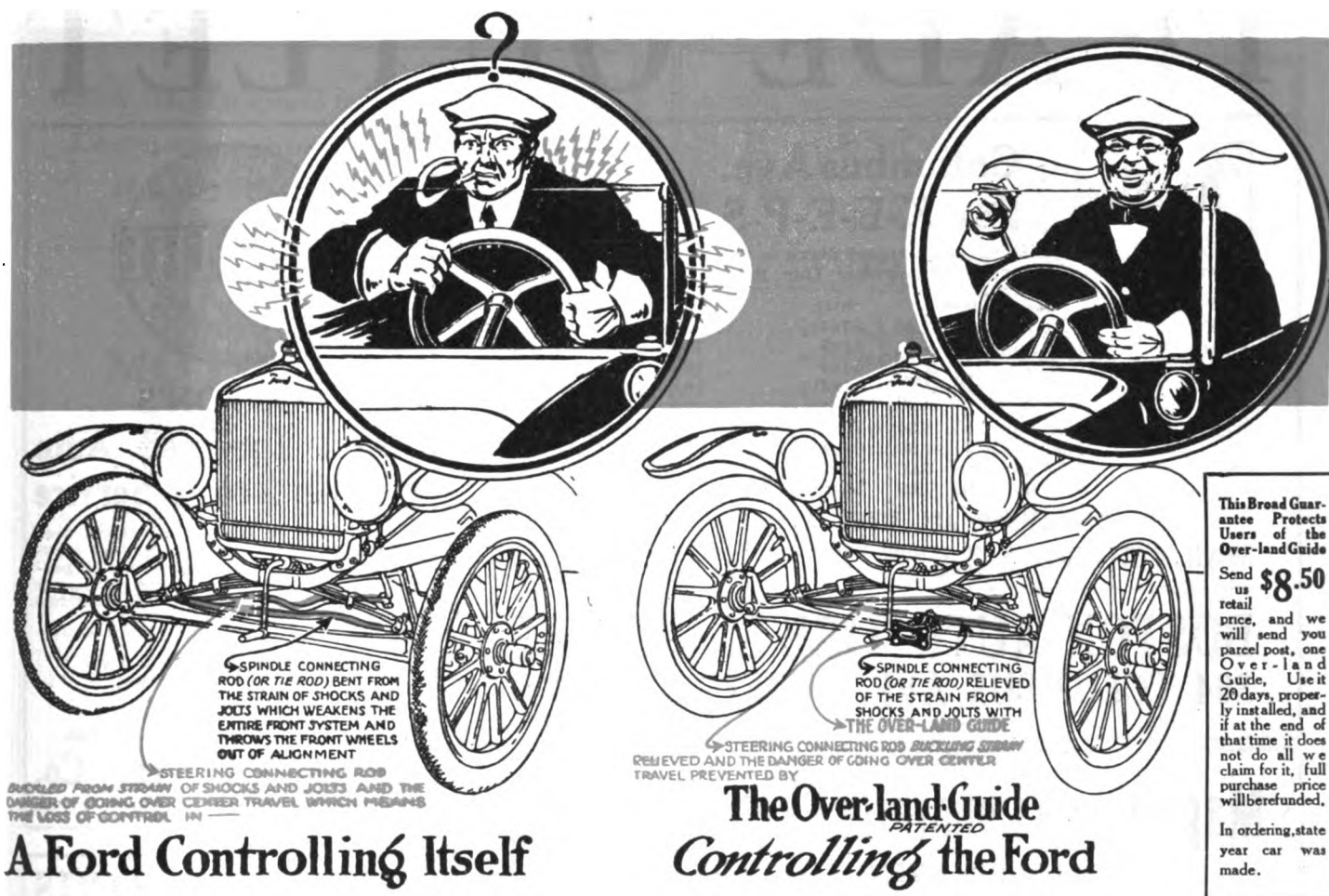
EAGLE OIL AND SUPPLY CO.
44-45-46 India Street, Boston, Mass.

NEW YORK CITY
Woolworth Building

CHICAGO
1132 W. 37th Street

AUTOMOBILE JOURNAL INDEX TO ADVERTISERS

	Page
Bancroft Tire Co.....	43
Barrett Co., The.....	41
Boston Auto Tire Exchange.....	8
Box 88.....	8
Brightman Auto Exchange.....	8
Brown Retread Tire Co.....	44
Brown Spring Oil Co.....	43
Coe's Wrench Co.....	43
Connecticut Auto Parts Co., Inc.....	8
Cormack Co.....	8
Culver-Stearns Manufacturing Co.....	44
Detroit Radiator & Specialty Co.....	8
Eagle Oil and Supply Co.....	3
Equipment Co.....	6
Flaherty, Wm. H. Co.....	8
Greb Co.....	42-46
Huffman Bros. Motor Co.....	1
Ideal Tire & Rubber Co.....	3
India Tire & Rubber Co.....	Cover
Madison Tire & Rubber Co.....	Cover
Magneto and Generator Exchange of N. E.....	8
Meixell Co., The.....	7
Mets Sales Corporation.....	42
National Can Co.....	47
New Departure Manufacturing Co.....	47
New York and New Jersey Lubricant Co.....	46
Nielsen Co., V. A.....	47
Northwestern Chemical Co.....	10
Palge-Detroit Motor Car Co.....	48
Pierce-Arrow Motor Car Co.....	Cover
Pettingell Andrews Co.....	4-5
Standard Oil Co. of N. Y.....	45
Strandway Auto Parts Co.....	8
Syracuse Rubber Co., Inc.....	Cover
Winther Motor Sales Corp.....	46
Zenith Carburetor Co.....	44



A Ford Controlling Itself

SPINDLE CONNECTING ROD (OR TIE ROD) BENT FROM THE STRAIN OF SHOCKS AND JOLTS WHICH WEAKENS THE ENTIRE FRONT SYSTEM AND THROWS THE FRONT WHEELS OUT OF ALIGNMENT

STEERING CONNECTING ROD BUCKLED FROM STRAIN OF SHOCKS AND JOLTS AND THE DANGER OF GOING OVER CENTER TRAVEL WHICH MEANS THE LOSS OF CONTROL IN —

The Over-land-Guide
PATENTED
Controlling the Ford

SPINDLE CONNECTING ROD (OR TIE ROD) RELIEVED OF THE STRAIN FROM SHOCKS AND JOLTS WITH THE OVER-LAND GUIDE

STEERING CONNECTING ROD BUCKLING STRAIN REMOVED AND THE DANGER OF GOING OVER CENTER TRAVEL PREVENTED BY

This Broad Guarantee Protects Users of the Over-land Guide

Send us retail price, and we will send you parcel post, one Over-land Guide. Use it 20 days, properly installed, and if at the end of that time it does not do all we claim for it, full purchase price will be refunded.

In ordering, state year car was made.

Every Ford Car Owner A Prospect, Mr. Dealer!

That means constant new business—business the year through, and no stock is more productive. Over-Land Guides have quality and utility, and are sold with a guarantee that insures satisfaction. They are economical for all owners, for they are economizers of upkeep and maintenance cost.

Why owners want Over-landGuides

They save tires, mechanical wear and increase vehicle life.
Prevent skidding and all dangers from uncertain control.
Protect vehicle and occupants should the steering gear break.
Control the machine should a tire blow out at any speed.
Keep the vehicle moving directly ahead and the wheels constantly aligned.
Increase driving pleasure and vehicle efficiency.
Absorb road shocks that would be communicated to the driver's hands and arms.
With it a machine can be steered with the finger tips.
May be changed from one machine to another.
Can be quickly installed without special tools.
Will last for years.

Over-land Guides Prevents Wear of

Wheels
Wheel Spindles
Steering Arms
Drag Link
Radius Rod

Tires
Steering Pivots
Tie Rod
Steering Lever
Spring

Wheel Bearings
Steering Knuckles
Tail Lever
Steering Column
Spring Shackles

List Price, \$8.50. If not satisfactory after 20 days' trial, when properly installed, money will be refunded.

JOBBER AND DEALERS: Our sales proposition is wonderfully attractive. A postal request will bring you a remarkable business opportunity.

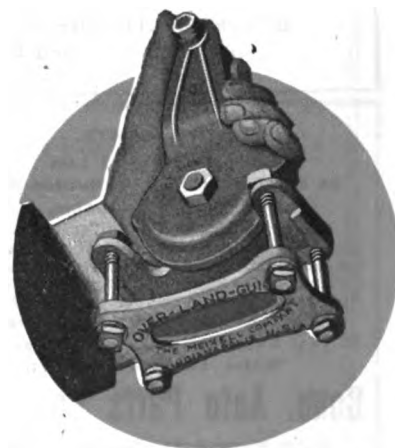
THE MEIXELL COMPANY

216 Board of Trade Building,

INDIANAPOLIS, IND.

(Automobile Sundries Co., 79 Walker St., New York, N. Y., Sole Foreign Agent.)

(When Writing to Advertisers, Please Mention the Automobile Journal.)



UNLIKE all other STEERING DEVICES the SPRING in the Over-Land Guide is packed in hard grease and completely enclosed, which keeps it free from dust and moisture and means indefinite service and no upkeep.

TRADE OUTLET

At 304
**Columbus Ave.
For K-E-E-P-S**
304

Selling Slightly Used Tires. The Largest Stock in the East. "Your Money's Worth or We Make Good." Remember Our Prices Will Interest You.

Size	Tires	Size	Tires
30x3	\$4.50 down to \$2.40	33x4 1/2	\$12.00 down to \$6.00
30x3 1/2	6.50 down to 3.40	33x5	14.50 down to 8.00
32x3 1/2	8.75 down to 3.90	35x4	10.50 down to 9.00
31x4	8.00 down to 4.00	34x4 1/2	10.00 down to 6.00
32x4	8.25 down to 5.00	35x4 1/2	12.00 down to 6.50
33x4	9.00 down to 5.50	36x4 1/2	12.00 down to 6.00
34x4	10.75 down to 6.00	35x5	25.00 down to 6.90
32x4 1/2	12.00 down to 7.00	36x5	12.00 down to 8.00
		37x5	14.00 down to 6.00

USED TUBES, ALL SIZES, AT \$1.50 TO \$2

MAIL ORDERS given prompt attention. Tires sent C. O. D. with privilege of examination. 5% discount if cash or money order comes with order.

BOSTON AUTO TIRE EXCHANGE
304 COLUMBUS AVE. TEL. B. B. 7329

Magneto and Generator Exchange of N. E.

44 COLUMBUS AVENUE, BOSTON, MASS.

SAVE 50%

Offers

Quality Service for your car.

Starting, Lighting, Ignition.

One year guarantee on repairs and installations of all makes.

Everything pertaining to Auto, Electricity, Magneto and Generator Parts. We have one of the best equipped shops in New England devoted exclusively to this work.

BOSCH, SPLITDORF, EISEMANN, DIXIE, BERLING MAGNETOS
and Parts Always in Stock.



AUTO PARTS.

50% to 90% Off List.

24 Hour Service. Unlimited Stock.

Pope-Hartford, Columbia, Reo,

Overland and 200 other makes.

Motors, \$20.00 up | E. Presto Tanks, \$4.00
Magnetos, \$3.50 up | B. Presto Tanks, \$4.75
Cylinders, \$3.00 up | Bearings, 50c up
Springs, \$1.00 up | Rims, \$1.00 up

1000 Other PARTS Bargains.

If you want any part not listed here,
Write Us—We Have It.

Conn. Auto Parts Co., Inc.

18-20 Morgan St., Hartford, Conn.

RENT OR SALE

**MODERN CONCRETE STEEL
RAILROAD SIDING PLANT**

32,000 SQUARE FEET.

In the heart of Jersey City at the door of the proposed vehicular tunnel; now fully equipped as a machine shop, foundry and blacksmith shop; over 200 machine tools.

15 ton overhead crane.

Complete power plant.

Suitable for machinery builders, auto truck makers, warehouse, etc. Up to date construction.

Floor capacity 250 lbs. square ft.
BOX 88 AUTOMOBILE JOURNAL.

AUTO PARTS—At Your Own Prices.
We can supply parts for nearly every make of car. 648 Packards, Interstate Fours, also Truck parts, GMC and other makes.

Write us for Parts. We have them.

STRANDWAY AUTO PARTS CO.,
128-126 E. St., South Boston, Mass.

SPEED OR POWER FOR THE FORD.

Install a set of:

2 1/2 —1 Gears in the Racy Type

3 —1 Gears in the Roadster

4 —1 Gears in the Delivery

Our Trade Mark—A star on every gear

insures quality.

DETROIT RADIATOR & SPECIALTY

CO., 965 Woodward Ave., Detroit, Mich.



BOSTON'S Finest Equipped Auto Electric Repair Service

With a staff of trained electrical men we can offer auto owners expert service, coupled with promptness and personal attention to all electrical repair problems. We also repair any electrical equipment used on a motor car. Official service and parts representative for

**AUTO-LITE LIGHTING AND
STARTING SYSTEMS.**
Complete Stock of
GENUINE PARTS.

All Work and Parts Guaranteed.

William H. Flaherty Co.

74 CUMMINGTON ST., BOSTON, MASS.

AUTO. SAVE 50-90% PARTS

POPE, PACKARDS, PIERCE, BUICK, STEVENS-DURYEA, KNOX, OVERLAND, ETC.

Motors, \$25.00 up	Presto Tanks, \$4.50 up
Magnetos, 4.00 up	New Spotlights, 2.50 up
Carburetors, 3.00 up	Generators, 10.50 up
Rear Axles, 15.00 up	Gears, 1.50 up
Front Axles, 5.00 up	Bearings, 1.50 up
Cylinders, 5.00 up	Radiators, 10.00 up

\$12 Diamond Bumpers.....\$5.50

Jobbers in Bankrupt Auto Supplies.

BRIGHTMAN AUTO EXCHANGE

321 Windsor Ave., Hartford, Conn.

Every Ford owner should read "Transforming the Ford." Tells how to secure smooth, positive brake action that no car can excel. A little "transforming" and your car will glide to a quick, quiet stop without the annoying, irritating clatter that you now experience. It will go into low or reverse without jumping or jerking, and you can pick up speed with all the smoothness and ease of a high-priced car. All accomplished without additional expense and the result is a clear saving of 75 per cent. in one direction alone. "Transforming the Ford" tells how it's done. Send for your copy this very minute. 10c stamps or coin. **CORMACK CO., Dept. 57, 566 Fifth Ave., New York City.**

AUTO TIRE VULCANIZING, a growing profitable business. Easy to learn. Instruction book \$1. Three weeks, practical school course free. Plants \$50 up. Catalogue free. Equipment Co., 191 Canal, Cincinnati, O.

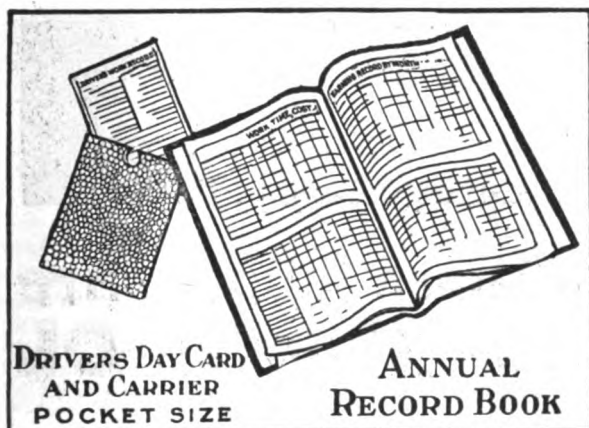
Classified Advertising BRINGS BIG RETURNS

20 Cents a Line, Seven Words to Line.

(When Writing to Advertisers, Please Mention the Automobile Journal.)

Know what it costs to Run your Truck
Learn what your Truck Earns
Know your Truck Profit and Loss

UNIVERSAL MOTOR TRUCK ACCOUNTING SYSTEM



The system includes an annual record book, 350 drivers' day cards, a day card carrier and full instructions.

Any Owner can start this system at any time with an old or new truck of any make or type.

Any boy or girl clerk can maintain all records for one or a hundred trucks.

Each system is good for one year, nothing more is needed or necessary.

The records show at a glance any and all items entering into the earnings and cost of operation.

It is extremely simple. 100% complete and full working instructions are supplied with each system.

It is almost self-operating.

Price \$10 — Delivered

Address Record Department

MOTOR TRUCK

Pawtucket,

Rhode Island.

AUTOMOBILE JOURNAL

INDEX TO CONTENTS

Published Monthly by the
AUTOMOBILE JOURNAL PUB. CO.
 Times Building, Pawtucket, R. I.

WILLIAM H. BLACK.....Treasurer
DAVID O. BLACK.....Secretary

Branch Offices: New York City, Chicago, Detroit,
 Boston, St. Louis, Cleveland.

SUBSCRIPTIONS:

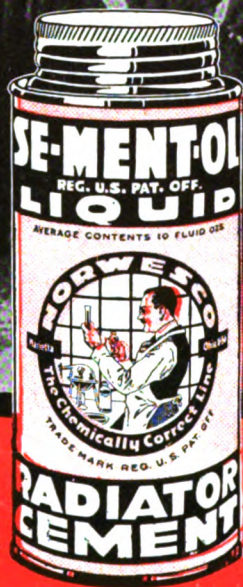
United States and Mexico (Postage Paid) the year \$1.50
 Canada\$2.50
 Foreign Countries in Postal Union.....\$3.50
 The Copy.....20 Cents

PARTIAL LIST OF CONTENTS

	Page
*Alarming Increase in Automobile Thieving	11
*Grand Central Palace to Be Closed	15
*Humorous Side of Motoring	16
*Points on Spring Overhauling, Continued	17
*Monthly Wiring Diagram, No. 5	23
*Repainting and Refinishing the Motor Car at Home	24
*Becoming Acquainted with Motor Car and Components	26
*Equipping Ford Front Hubs with Timken Bearings	28
Where "Orphan" Car Parts May Be Obtained	29
*Notes of the Industry and Trade	33
Simms Co. to Build Light Four Car	33
*Truck Manufacturers at Timken-Detroit Conference	33
*Cloud Accessories Co. Formed	34
*New Tank Shop for Wayne Co.	34
Campaign to "Boost" Buffalo	35
*Milton Makes New Speed Records	35
*Tire Industry and Trade	36
*Recent Promotions by Goodyear Co.	36
Portage Rubber Co.'s New House Organ	37
*Smith Superintendent Syracuse Rubber Co.	37
*New Accessories	38

*Indicates Article Is Illustrated.

Filmed at Gathering of Leading Jobbers in
Marietta, Ohio, Nov. 8-12-1919



These Were the
Jobbers Present.

S. K. Wallace, Tampa, Fla.
A. J. Hopkins, Montreal, Quebec.
E. V. Plane, Columbus, S. C.
G. B. Shearer, Philadelphia, Pa.
J. N. White, Dallas, Texas.
A. A. Ways, Dallas, Texas.
A. J. Johnson, Cincinnati, Ohio.
J. G. Fitzsimmons, Charlotte, N. C.
W. H. Van Horn, Oil City, Pa.
F. Hamilton Suter, Milwaukee, Wis.
Dunbar Abston, Memphis, Tenn.
W. Justice, St. Joseph, Mo.
Troy B. Wildermuth, Harrisburg, Pa.
H. B. Smith, Cleveland, Ohio.
H. T. Schleining, New York, N. Y.
M. Shapiro, Philadelphia, Pa.
W. L. Ferrier, St. Louis, Mo.
Walter Duda, Kansas City, Mo.

Why These Jobbers are "Sold" on SE-MENT-OL

If there had been any doubts of the efficiency of SE-MENT-OL, they vanished in face of the conclusive tests of this radiator repairer before the assembled jobbers.

They saw a radiator, spurting water from several leaks, completely repaired in *seven minutes* with a can of SE-MENT-OL. The permanence of SE-MENT-OL repairs was convincingly demonstrated when a can in which several holes had been SE-MENT-OL sealed was thrown time and again down a flight of concrete stairs until the can was almost demolished—before a single repair opened.

In similar tests they were shown that SE-MENT-OL could not possibly clog or injure the radiator.

Now these jobbers know why SE-MENT-OL is guaranteed for the life of the car. They know that they can stand back of it to the limit. They will recommend that you *stock* SE-MENT-OL—*concentrate* on it—and *push* it.

The demonstration before the jobbers was filmed and the film will be shown throughout the country through the courtesy of jobbers.

The Northwestern Chemical Co.,
725 State Street, Marietta, Ohio, U. S. A.
Canadian Factory: Montreal.

SE-MENT-OL

The Radiator Repairer That Is Guaranteed for the Life of the Car

(When Writing to Advertisers, Please Mention the Automobile Journal.)

Alarming Increase in Automobile Thieving

Drastic Measures Called for to Prevent Depredations—Greater Care Needed on Part of Motorists.

THE great need for some drastic means to prevent the alarming increase in automobile thieving throughout the country is defined in the statistics given out by the police of the 15 leading cities of the United States, showing the number of cars stolen and recovered in their respective districts. The total number of cars stolen is given as 19,810, of which 15,249, or approximately 76 per cent., were recovered.

The total number of cars reported stolen in 18 western and mid-western cities during 1918 was 22,273. The city of Detroit, Mich., headed the list with 2637 cars stolen; Chicago came second with 2611, and St. Louis third with 2241.

Kansas City, Mo., led in the list of total percentage of cars not recovered, 46 per cent.; St. Louis was second with 40 per cent. of stolen cars absolutely lost.

A report recently made to the members of the Virginia State Automobile Dealers' association stated that more than \$28,000,000 worth of motor cars were stolen during the past year throughout the country, representing a total of 27,000 vehicles. But amazing as they are, these statistics fall considerably short, the police report, of the record of the very latest months.

Thieves have found the automobile field one in which they can reap rich har-

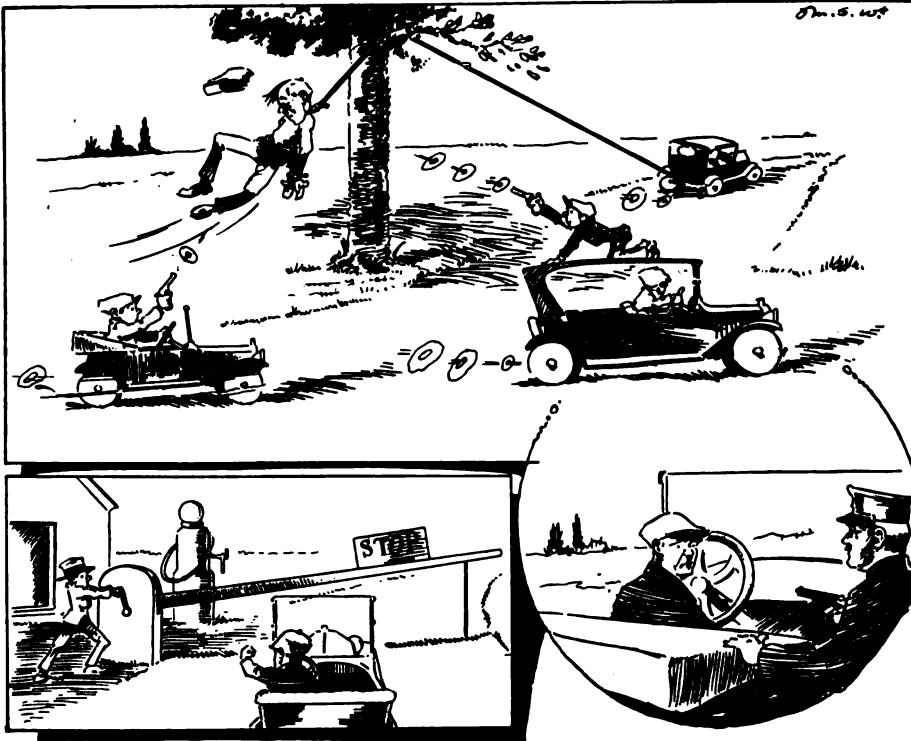
vests, due in a great measure, no doubt, to the fact that there are so many cars now in use in the United States. And, in many cases, it has appeared that the miscreants have had no trouble whatever in obtaining new license plates and certificates of registration from the authorities having those matters in charge. They drive the stolen cars from one state to another and oftentimes have confederates there who receive and sell them. The situation is steadily becoming worse, despite the increasing severity of penalties imposed on offenders brought to justice, and it is getting continually more and more difficult for car owners to obtain theft insurance due to

the great losses the underwriting companies have sustained. During the past year automobile theft insurance rates on the mass of cars have increased 100 per cent. It is the low priced cars that are more generally stolen as the high priced machines are not so easily disposed of.

In the face of these serious conditions the cooperation of all law-abiding citizens should be called to the assistance of the police and other officials in the capture and conviction of such outlaws. Automobile and dealers' associations in nearly all centers are now lending their aid insofar as possible, state and national legislation bodies have been invoked to pass laws imposing severe pen-

alties for thefts, and devices claimed to be efficient for the prevention of the driving away of cars by thieves and joy riders have been invented and placed on the market by the hundred, and there has still been but little abatement of the depredations.

While nearly all states have provided for the punishment of these offenders, it is claimed that the so-called Dyer or National Motor Vehicle Theft act, recently enacted by Congress, has proved the severest setback to automobile thieves of any before put in force in any state or community. This, in its third section, provides "that whoever shall transport or cause to be trans-



Public Opinion Aroused to Such an Extent in South and West as to Call for Vigilante Methods of the Old Days—Barriers and Armed Guards.

ported in interstate or foreign commerce a motor vehicle, knowing the same to have been stolen, shall be punished by a fine of not more than \$5000, or by imprisonment of not more than five years, or both."

The term "motor vehicle" is defined by the act to "include an automobile, automobile truck, automobile wagon, motorcycle, or any other self-propelled vehicle not designed for running on rails." The term "inter-state or foreign commerce" as used in this act shall include "transportation from one state, territory, or the District of Columbia, or to a foreign country, or from a foreign country to any state, territory or the District of Columbia."

Other sections of the act are as follows: "Section 4. That whoever shall receive, conceal, store, barter, sell or dispose of any motor vehicle moving as, or which is a part of, or which constitutes inter-state or foreign commerce, knowing the same to have been stolen, shall be punished by a fine of not more than \$5000, or by imprisonment of not more than five years, or both.

"Section 5. That any person violating this act may be punished in any district in or through which such motor vehicle has been transported or removed by such offender."

Uniform Auto Theft Law.

The most comprehensive campaign against the auto thief has, however, been carried on by the Motor Vehicle Conference committee composed of representatives from the American Automobile association, the Motor and Accessory Manufacturers' association, the National Rubber Dealers' association, the Rubber Association of America, Inc., the Trailer Manufacturers' Association of America and the National Automobile Chamber of Commerce, Inc. This committee has been giving very careful attention to state laws designed to curb motor vehicle stealing and finds that they are open to serious criticisms on the following grounds:

First: Only a few states have made to date a serious effort to pass comprehensive anti-theft of vehicle laws.

Second: Few of these states have enacted laws which fully cover every detail of procedure which those who have given closest attention to the subject believe necessary.

Third: The procedure of one state differs widely from that of another and the mechanisms for the prevention, detection, arrest, trial, conviction and punishment of motor vehicle thefts bear such slight resemblance to each other that coordination and cooperation between states is impracticable.

Neglect Aids Automobile Thieves.

The stealing of automobiles will continue, in greater or less degree, according to the severity of the punishment, until a change in human nature is effected, not alone in the thief, but also in the owner.

Automobile thieves can be placed in two classes, professionals and amateurs. The professional is generally an expert mechanic usually equipped with tools to render practically every safety device

valueless. He will usually steal the car he wants regardless of obstacles. Heavy punishment alone can discourage this type of criminal.

But the amateur is more often an opportunist. He steals automobiles or accessories because unusually good opportunities present themselves. He may be compared to the sneak thief who will only rob a house when a window is open or a door left unlocked. Carelessness is his best ally. A little observation will reveal many instances in which a car driver, after parking the car, threw the ignition switch to "off" position and then left his keys in place. Every automobilist may well inquire how often this has been done by himself and friends, thus giving a direct invitation to any person who may be making it his business to sneak around looking for just such chances. Greater care should be exercised in this regard.

Revival of "Vigilante" Days.

Public opinion has been aroused to such a height in some states by the depredations on automobile owners as to call for the adoption of strenuous measures to curb them in addition to legislation. For instance, according to reports from Los Angeles, Cal., a revival of the old "Vigilante" days is planned by the Automobile Club of Southern California to render the highways more secure and to prevent theft. A vigilance committee of 200 prominent business men has been formed who will always be on the job and act secretly, but not the less promptly and effectively. Each will be pledged not only to seek out automobile thieves, but also to report promptly by mail on post cards furnished for that purpose, all infractions of the motor laws observed by him. Machines will be traced by license number alone.

STOLEN CAR RECORDS OF FIFTEEN CITIES.

City	Stolen	Recovered	Pct.
Salt Lake City	797	790	99%
Seattle	1,451	1,376	94%
Los Angeles...	1,629	1,499	92%
Portland, Ore.	1,088	990	90%
Cleveland	2,076	1,816	87%
Oklahoma City	541	484	84%
Cincinnati	348	291	83%
Columbus, O..	451	351	78%
Chicago	2,611	1,954	74%
Boston	856	607	70%
Detroit	2,637	1,834	69%
Denver	901	627	69%
Omaha	1,039	669	64%
St. Louis.....	2,241	1,354	60%
Kansas City...	1,144	606	54%
Total.....	19,810	15,249	

redations on automobile owners as to call for the adoption of strenuous measures to curb them in addition to legislation. For instance, according to reports from Los Angeles, Cal., a revival of the old "Vigilante" days is planned by the Automobile Club of Southern California to render the highways more secure and to prevent theft. A vigilance committee of 200 prominent business men has been formed who will always be on the job and act secretly, but not the less promptly and effectively. Each will be pledged not only to seek out automobile thieves, but also to report promptly by mail on post cards furnished for that purpose, all infractions of the motor laws observed by him. Machines will be traced by license number alone.

To make this plan more effective a "telegraphic barrage," designed to trap thieves, has been put into operation at Los Angeles. With the sheriffs, city police, members of the automobile club and insurance companies all cooperating and working at top speed to catch offenders,

a system has been organized which, it is thought, will be the most effective of any yet tried. The big game of automobile thieves in Southern California in recent months has been to drive the stolen cars out of the state before offering them for sale. It is the purpose of the telegraphic barrage to break this up.

Under the arrangement, as soon as the theft of a motor car has been reported authorities in the towns nearest the state boundaries on the east and south are notified. It may chance that the closest border town is in Nevada, Arizona or Lower California, but that makes no difference.

The officer of the law is informed by telegram to be on the lookout for a car of the given description. It may be thought that it would be an easy thing for thieves to circumvent such a plan by avoiding the towns, but in a sparsely settled section where there is but one road, even motor car thieves will prefer arrest to taking chances on the unmarked desert.

Still another plan proposed which ought to prove quick and effective is to make all employees at roadside gasoline filling stations deputy sheriffs. Each station would be furnished with a telephone and a road barrier similar to the old fashioned toll gate. As soon as a report of a stolen car is received anywhere along the line, every gasoline station deputy would be notified by telephone. The road barriers would be let down and not a car be permitted to pass until it had undergone inspection. It would be made a serious offense to break through a barrier.

Maryland to Guard Highways.

The Automobile Club of Maryland is stated to be the sponsor of a bill before the state legislature calling for an appropriation to carry on the work of catching automobile thieves. The tentative plan is to have guards stationed on all the principal highways leading out of the state and near the state lines. All the guard houses are to be connected by telephone with a central exchange located in Baltimore. If necessary an exchange could be established that would handle only calls reporting the thefts of motor cars. Upon receipt of notice that a machine has been stolen, the exchange would send out word to every guard on duty and a sharp watch would be kept for the "auto jack." The automobile club is in favor of making the guards special policemen and would have them armed so that they would be in a position to stop them at any cost.

The chief objection to any such elaborate means of defense against automobile thieves is the expense of its installation and operation, but if the depredations continue to increase at the present alarming rate, almost any effective system of protection would be found economical in the long run.

Operation of the State Laws.

Nearly all the state laws make it a misdemeanor for the changing or effacing of trade numbers or any other distinguishing identification marks on cars, and in many commonwealths bills of sale or certificates of ownership are required to be

made out when the car is purchased and must accompany the car at all times and be transferred with the car in case it is sold.

In Michigan a new law requires automobile dealers and garage owners to make duplicate records, in ink, of all cars sold, purchased or exchanged, specifying the date, the name of the purchaser or vendor and the make, serial number and a minute description of the vehicle. Copies must be forwarded to the secretary of state the first day of each month, the department furnishing the necessary blanks.

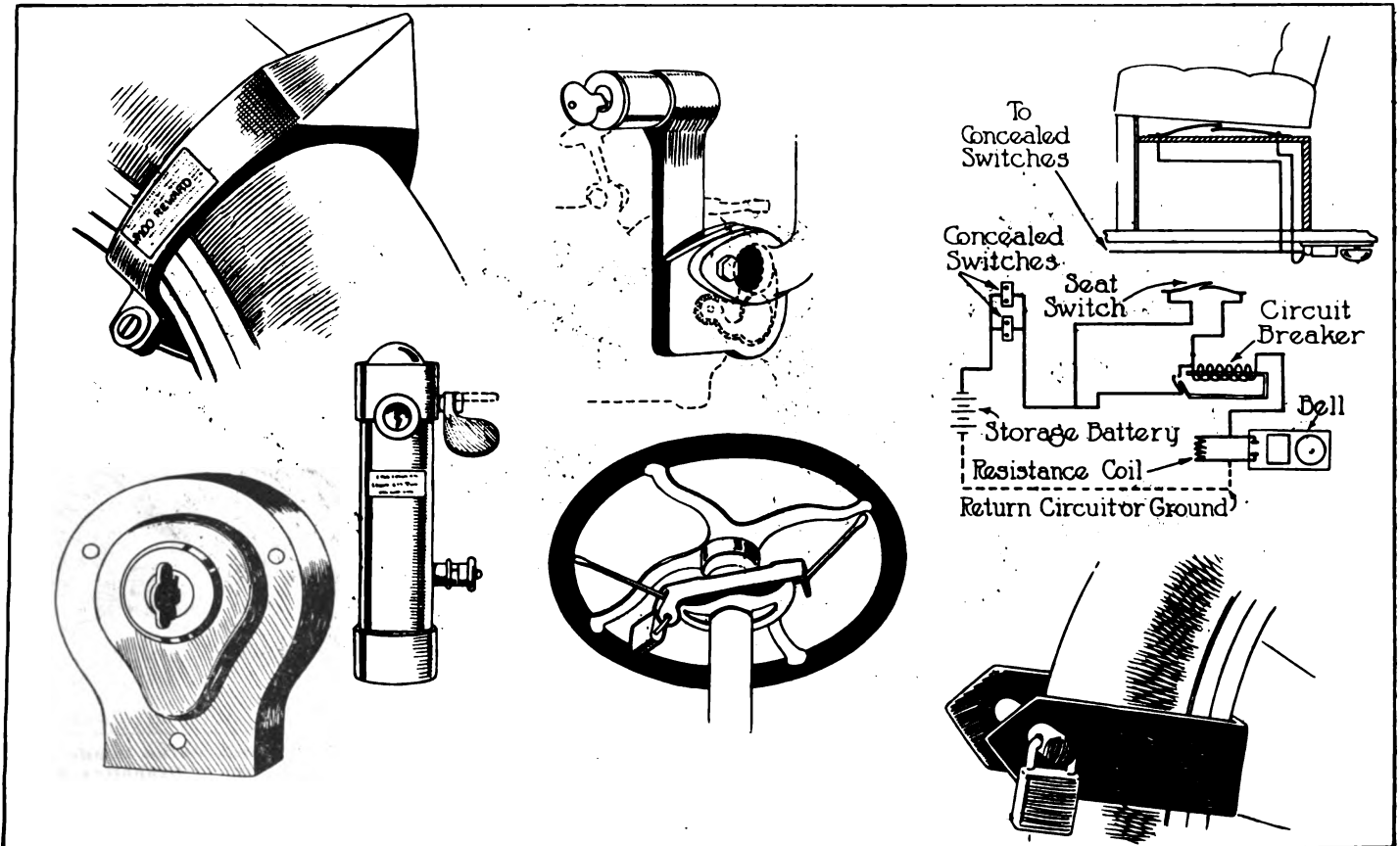
Section 28 of the Massachusetts Motor Vehicle act requires that "every person operating or running a motor vehicle into or out of a garage shall enter or cause to be entered in a book provided for the

market to prevent the unauthorized use of a car, but the professional thief has usually found ways to surmount the most ingenious of the conventional "thief-proof" attachments. Where the ignition is locked the crook manages to short-circuit the lock by simply connecting around it with a wire leading from the battery to the igniter. Gasoline locks are useful, but somewhat complicated in their installation and introduce the undesirable element of an additional opportunity for gasoline leakage. Probably the favorite method is a purely mechanical lock on the steering gear, starting crank or some other essential part of the mechanism. Where the device prevents the starting of the motor another car and tow line can be brought forward in an emergency to draw the car to a place

tion of the wheel will cause the car to wobble in a drunken manner. This will attract the attention of all passers-by and serve as an effective alarm of theft. If the car is run any distance, in spite of the shackle, the pointed nose will leave an easily followed trail.

Moreover, the device bears a plate on which is plainly indicated that the company furnishing this equipment will pay a reward of \$100 for the arrest and conviction, on the charge of grand larceny or other felony charge, of anyone operating an automobile guarded by the lock or tampering with it in any way, or trying to remove it from the wheel without the proper key.

Another late device that operates on the burglar alarm principle is one in which, when the thief takes his place in



Some Typical Forms of Locking Automobiles When Not in Use: At Top, Left Hand, Lock Attached to Wheel. Lower Right Hand, Hand Sketch Shows Simple Home-Made Device Embodying Same Principle. Upper Center, Form as Applied Between Carburetor and Intake Manifold. Upper Right, Design by Which Thief Rings Concealed Alarm When Taking His Place on Car Seat. Lower Left, Conventional Switch Lock and Attachment for Brush Connection. Lower Center, Spark Lever Lock.

purpose in the columns under the proper headings, the date and time of entering and leaving, the register number and letter, if any, of the motor vehicle, and the full name of the operator or chauffeur." The section further reads: "In case of motor vehicles operated or run into or out of a garage by others than chauffeurs, the records shall be kept by the owner, proprietor or person in control of the garage, or by some employee or employees specially designated for this duty and the said owner, proprietor or persons in control of said garage shall be responsible for the proper keeping of such record. All entries in said book shall be made legibly in ink or with an indelible pencil."

Many devices have been placed on the

where it can be safely transformed at leisure or stripped and abandoned.

Devices to Guard Against Theft.

One of the latest attempts to foil the automobile thief in the way of a mechanical device is in the form of a red steel shackle pointed in shape like the nose of a bullet, which is attached and locked to the right front wheel of the car. The lock is of the five-pin tumbler type. The shackle fits over the wheel and tire like a handcuff. It stands out prominently and becomes a vigilant watchman. It does not interfere with the mechanism in any way or cripple the car in any manner, but if a fool-hardy thief attempts to move it the sharp-pointed nose of the shackle will strike the ground with a resounding whack and with every revolu-

the driver's seat, an invisible alarm bell under the car starts ringing and continues to ring even after the thief leaves his seat and seeks safety from the police or passers-by who are sure to be attracted by the sound of the bell. The bell will continue to alarm until the owner returns or someone succeeds in finding the hidden control switch and turns it off. Of course, if the thief is ingenious enough to find this switch at once, he can turn it off himself, but there is small chance of a thief working very long around a car to the accompaniment of a loudly clanging bell.

Mark Your Car.

As it is easy for a thief to change numbers and obliterate all ordinary points of a car's individuality, as well as to re-

paint and otherwise so transform it that it would not be recognizable even by an owner thoroughly familiar with it through a long period of service, every car owner should, as soon as it is purchased, take pains to place on it some means of identification in case it should be stolen.

Numerous instances are recorded where a stolen touring car has been built over into a light delivery vehicle and resold. Open cars may be transformed into enclosed models and vice versa, while a common way is to interchange various parts of similar models and repaint and then place again on the market.

It is probably the fact that a majority of cars stolen are stripped of tires and other valuable parts and equipment and abandoned and, while it undoubtedly would not be very difficult for the owner to identify his machine even in its dismantled condition, such private means of

scheme in accordance with his own ideas.

Car Owner Should Cooperate.

In conclusion, the main thing is for the car owner, in the first place to cooperate as far as he possibly can to obviate all chances of theft. Of course it would be ideal if the car were never left alone on the public highways or in the open, but as this is impossible in many cases, care should be exercised in parking so that it may be, as far as possible, under the constant or frequent observation of the owner or his representative. Doors of private garages or the compartments in public service or community garages should be kept locked and windows fastened at all times when car is not in use, and in addition, all the mechanical means of preventing the unauthorized use of the machine should be left in force on the car at this time.

Secondly, some form of locking device attached to the car, while perhaps it would not entirely prevent theft, would

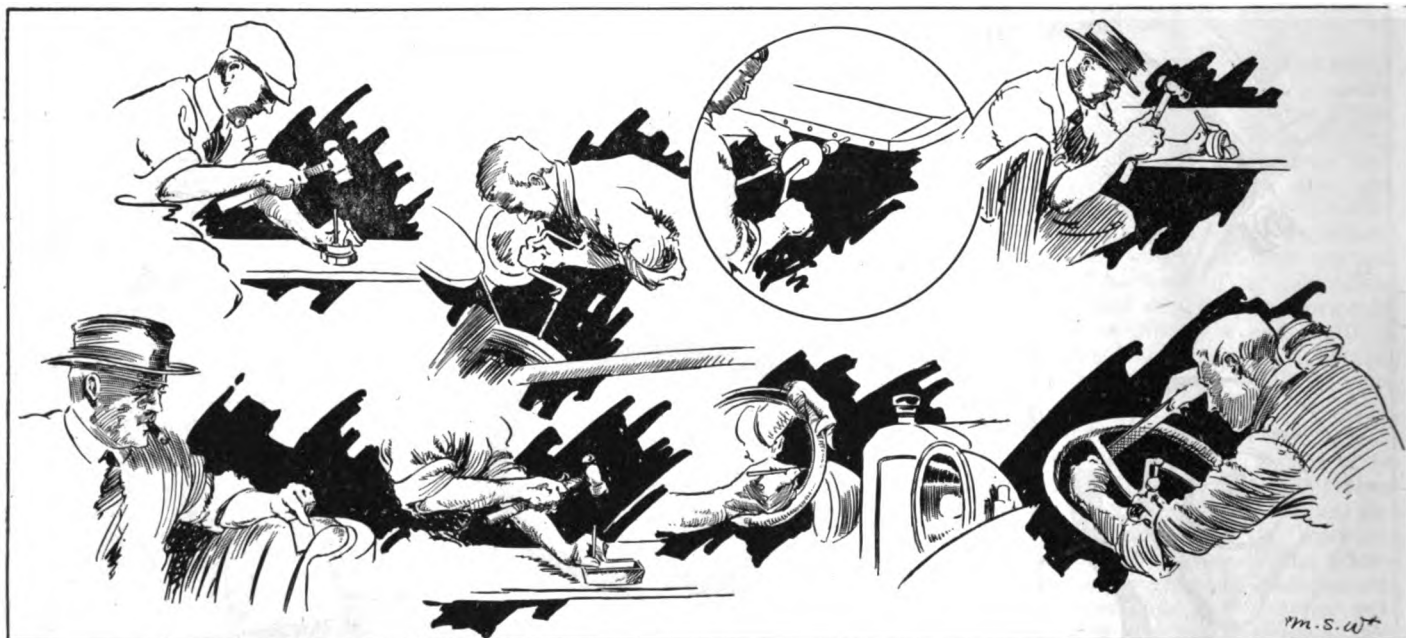
cumulative sinking fund preferred stock is now offered at par, \$100 a share. For every two shares of preferred stock the purchaser will be given the right to buy one share of the new no-par-value common stock at the price of \$50 a share.

The purpose of this stock increase is to take care of future expansion and to supply funds as needed in the enlargement of the plant.

DES MOINES DEALERS' ACTIVITIES.

With the reorganization of the Des Moines Dealers' association a new system of activity was inaugurated whereby each director will be at the head of an important committee assuming the responsibility for work in his department.

The directors and the lines of work they will supervise are as follows: Don Chamberlain, fours; L. B. Chase, trade practices; R. E. Stacey, advertising and publicity; A. M. Brackett, finances and



Some Simple Ways of Placing Private Identification Marks on the Car: Above, Left to Right—Place Punch Marks Inside of Radiator Cap; Bore Very Slightly a Certain Number of Holes in Frame and Cover Marked Spot with Paint or Graphite; Additional Screws in Running Board Would Never Be Noticed; Stamp Initials or Any Other Mark in Hub Cap. Below, Left to Right—Pull Out a Few Upholstery Tacks, Slip in Visiting Card Under Leather and Tack Down Again; Place Secret Mark Inside of Generator Cover; Inscribe Name or Initials Around Inside Rim of Head Light; File Notches on Under Side of Upper Arm of Steering Wheel.

recognition would save confusion in the event of a number of cars of the same model being stolen from the same locality.

The system of the location of these private identification marks need not be elaborate, but they should, of course, be placed where they would not likely be noted and obliterated by thieves. Several marks in various places would seem to be better than a single one for, even if one should be discovered and eradicated, the chance that all such marks would be found is remote.

It is further suggested that the owner make a record or chart showing the character and location on the car of all such means of identification.

The accompanying illustration merely suggests several simple methods of the location and affixing of private identification marks, but an ingenious owner or driver will probably desire to work out a

make it more difficult for the thief to get away with the car without observation.

Finally, some private mark or marks should be placed on the car as a help to the authorities in tracing stolen machines and putting evidence in their hands to prove conclusively that the car was stolen, as well as affording an immediate and positive method of identification when recovered.

FRANKLIN STOCK INCREASE APROVED.

The board of directors of the H. H. Franklin Manufacturing Co., Syracuse, N. Y., has approved an increase in preferred stock capitalization from \$5,000,000 to \$15,000,000, and also an increase in common stock from 20,000 shares, par value \$100, to 600,000 shares of no par value; \$1,500,000 of seven per cent.

legislation; William Gibson, shows and expositions; L. A. Doren, meetings and programmes.

Harter B. Hull, who has been president of the association for the past three years, is to inaugurate a series of monthly dinners.

The association is formulating plans for a truck show to be held in connection with Iowa state fair in August.

FORT WAYNE DEALERS' OFFICERS.

Following are the officers of the Fort Wayne Automobile Dealers' Trade association, recently elected: President, Matt Jones; vice president, Ward Becker; secretary, C. Schiefer; treasurer, Fred Pennell. The association presented the retiring president, A. L. Randall, with a gold watch and chain. Mr. Randall has presided over the association since its organization, five years ago.

AMERICAN GRINDER MANUFACTURING CO. EXPANDS.

Due to the phenomenal growth of the wrench business of the American Grinder Co., Milwaukee, Wis., it has been necessary to recapitalize this concern in order that production may be extended to fill the demand for Blackhawk steel socket wrenches for automotive use. Thus it is that Herbert, Herman and George Brumder, bankers, and George, Adam and Fred Mayer, owners of the F. Mayer Boot & Shoe Co., have become affiliated with the American Grinder Co., Herbert Brumder becoming treasurer.

Sales of Blackhawk wrenches are in the hands of C. N. and F. W. Jonas, a widely known sales organization, with headquarters at Chicago and branches at Los Angeles, Cal.; Seattle, Wash.; San Francisco, Dallas, Tex., and Atlanta, Ga. The Jonas concern also sells the American Grinder Co.'s line of American hand and power grinders west of the Mississippi, while east of that river sales of these machines are in the hands of John H. Graham & Co., which is also responsible for the foreign sales of Blackhawk wrenches.

PEERLESS AUTOMOBILE SPECIALTIES.

The Columbus Varnish Co., Columbus, O., reports an unusually large demand for its Peerless automobile specialties this season, as most of these products deal with the upkeep of the car rather than being adapted to new vehicles and the work of renovating old cars has been particularly heavy this year on account of the difficulty in many cases of securing delivery of new cars. The Columbus factory is way behind on its orders, but is giving everyone the best service possible, rushing goods to its customers by express instead of by freight as ordinarily.

The biggest demand is for such products as top dressings, including both the mohair and leather, the enamels, and particularly the gasket shellac. Cooperative work is done from the factory by supplying garages and dealers with window display material, mailing inserts, catalogues, etc.

THE NIEHOFF MAG-CHARGER.

Paul G. Niehoff & Co., Inc., 232-242 East Ohio street, Chicago, Ill., is now marketing the Niehoff Mag-Charger, which is especially designed to fulfill a long felt want for recharging Ford magnets and burning out shorts in the Ford magneto case. The entire recharging is done, it is claimed, in a few minutes, and any ordinary mechanic can operate successfully.

The Niehoff Ford recharging apparatus is a complete electrical testing outfit as well, and may be used for testing Ford coil units, electric bulbs and spark plugs. With this outfit established in a convenient place so that the car can be run alongside, it is stated that in less than 15 minutes the garage man can recharge, burn out all shorts and make an entire test of the ignition system.

Grand Central Palace to Be Closed

THE announcement that the Grand Central Palace, New York City, is to be closed to all expositions after April 1, 1921, will be of interest in automotive circles all over the country who have associated this structure with the annual automobile and accessory shows for a number of years past.

It is understood that the organization, headed by Alfred I. du Pont, which owns this property, will convert the exposition halls to business purposes.

The Grand Central Palace was built in 1912 and has housed practically all the large expositions and business shows

to be available for industrial expositions and events of such nature.

New York City, after April 1, 1921, it was said, will be the only city in the United States or Europe with a population more than 200,000 without a representative exposition building. It was learned that the notice, which was sent out by Frederick W. Payne, manager of the Grand Central Palace, had caused managers of expositions to make arrangements to hold their enterprises in other cities, notably Chicago and Atlantic City.

When the organization with which



Grand Central Palace, Well-Known New York Exposition Building, to Be Converted to Business Purposes.

held in New York in recent years. These included the automobile show, the electrical exposition, the motor boat show, the chemical industries exhibition, the flower show and the own your own home show.

The four exposition halls in the building cover in the total number of feet of floor space a larger area than any other auditorium in the city, not excluding Madison Square Garden. It was said in real estate circles that the great demand for space for business purposes would enable the owners of the building to get \$5 or \$6 a square foot rental.

Exposition men said the decision would mean that many conventions and exhibitions held in New York annually would have to go to other cities. The Grand Central Palace was said to be the only building in New York in which large gatherings of such a nature could be held. The only other large auditorium, Madison Square Garden, it was held, was too greatly in demand for sporting exhibitions and enterprises like the circus

Mr. du Pont is connected purchased the leasehold of the building announcement was made on behalf of Mr. du Pont that the building would be used as a great market place for the exhibition of goods of all sorts from various parts of the world so that they might be viewed by domestic buyers. The International Exposition of Industries was the name given to the market place established in the building.

Exposition men some time ago received a notice from the Grand Central Palace that beginning on Jan. 1, 1920, the building would be closed to further expositions. Protests were made at the time and the matter was apparently dropped. Then followed the notice that the Palace would no longer be available after April 1 of next year.

The Grand Central Palace is 12 stories in height. Four floors are used for exhibitions and offices. Permanent exhibits occupy the remainder of the building. During the war it was an army base hospital.

HUMOROUS SIDE OF MOTORING

SOME CAR, WE'LL SAY.

The following is taken from a notice recently heralding the advent of a new car on the market:

"Whizzing speed! Peaceful idling!—it makes a fellow's blood tingle to look at a car like this and feel that it belongs to him; unleashed it will roar nose to nose with an express train; checked it will glide along composedly behind a mule team; a spirited car, ravenous to devour the miles; a gentle, soothing car, mild as a kitten; coachwork with the symmetry of a Rembrandt; springs that lull where others crash; upholstery from a cow's back—the lightest good six made."

OPPOSITE THE FRONT END.

A well-known accessory salesman, while on a recent trip through the southwestern states, says that he saw the following sign on a garage:

Batteries
Charged
In the Rear

He says he has been selling batteries for a long time, but has never yet discovered which is the rear end of a battery.

MUST BE AN OPTIMIST.

Jack Smith, shipping clerk for a well-known tire factory, says that an optimist now-a-days is a distributor who orders a bunch of tires sent to him by freight and expects them to arrive the next afternoon.

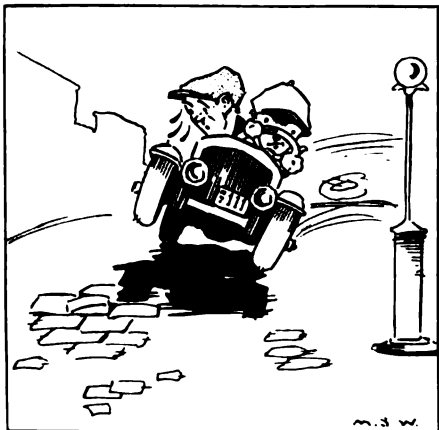
WE BELIEVE IT THIS SPRING.

At Braintree, Mass., the driver of a coal truck, plowing through 18 inches of water, had to blow his horn to warn a fleet of row boats to get out of his way.

WHAT THE KNOCK WAS.

Motorist (rounding a corner at full speed)—Do you hear those cylinders knocking?

Timid Companion—That's not the cylinders; it's my knees.



ALL IN THE FAMILY.

Charles Dunn, a Lock Haven, Pa., motorist, was brought before his brother, Mayor Clarence Dunn, who has jurisdiction in such violations of the city ordinances, charged with failure to display a 1920 license tag on his car. The mayor refused to accept his brother's explanation that the tag was under the seat, but that he had not had time to put it on.

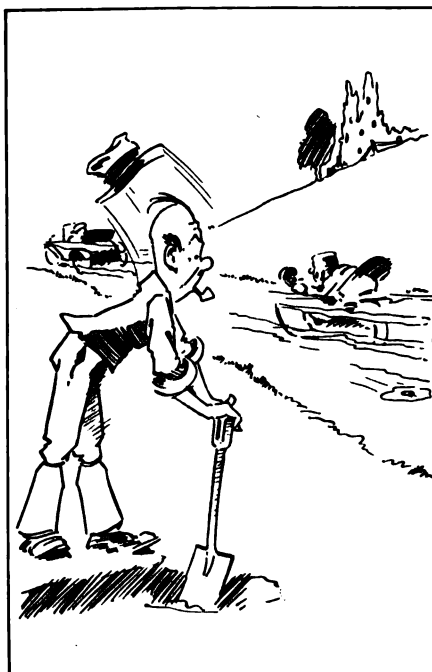
"This hurts me more than it does you, Charlie," said the mayor in pronouncing sentence, "but it won't cost me as much."

SOMEWHAT ABSENT-MINDED.

A farmer in Greenfield, Ind., drove to town on business, accompanied by his wife. His errands done, he drove home, forgetting his wife and leaving her behind. As he was somewhat frugally inclined she took occasion to jog his memory by going home in a taxicab at his expense.

WHO WOULD 'A' THOUGHT IT?

Jerry was a new farm hand, from the remote back woods, who had never seen an automobile. While working on the road one day, he was startled by the brazen honk of an automobile horn and, stepping aside, watched a little red runabout speed by. As he stood there dumbfounded, an unearthly shriek smote the air, and a red motorcycle, which had been trailing the motor car, tore past. "Gosh!" said Jerry, "who'd 'a' thought that thing had a colt?"



THE MOTOR LYRE.

There was a man in our town who owned a motor car.

He was a common kind of a man, like you and others are.

His car was just the kind of car that you and I would drive,

But when you hear him tell it, it's the only car alive.

He never has a bit of grief and never any woe.

It never has to be repaired, the upkeep cost is low.

He's driven it ten thousand miles, through hill and dale and trench—

But no repair shop workman ever touched it with a wrench.

He fibs.

I know another fellow, too, a fairish kind of chap.

Who says he's driven every road that's shown upon the map.

He says he just runs out his car and puts 'er into high

And then keeps running on and on as free as swallows fly.

He never has to stop and fix a tire or a wheel.

His car runs just as easy as a moving picture reel.

His tours are so free from care they almost seem a bore.

His car has never stood on any service station floor.

He prevaricates.

I've got an automobile, too, a dandy little bus.

That takes me where I want to go without too great a fuss.

It isn't just a perfect car, it has a fault or two.

There's nothing perfect in the world, not even me or you.

Sometimes the car will cough a bit and oftentimes it shakes.

Sometimes we even laugh about the funny noise it makes;

But in a pinch it seldom fails to take us where we'd go.

I listen while these other fellows spin their yarns, and so—

I can brag a bit myself.

—Exchange.

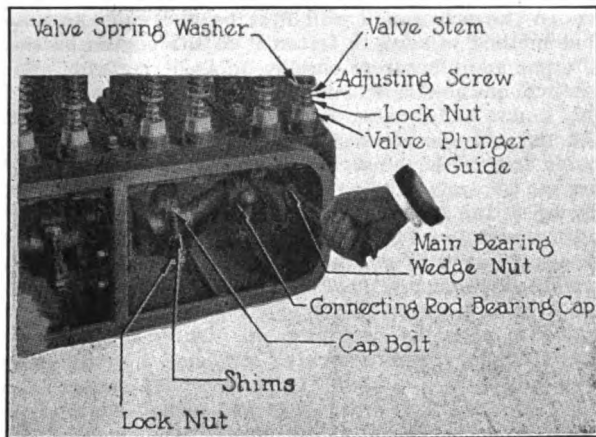
HE SWORE ALL RIGHT.

Village Constable (to villager who has been knocked down by passing motor)—You didn't see the number, but could you swear to the man?

Villager—I did, but I don't think 'e 'eard me.



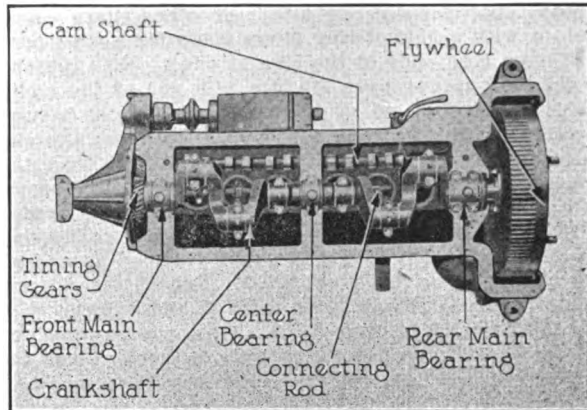
POINTS ON SPRING OVERHAULING



Tightening Main Bearings After Removing Side Plate of Engine Base.

(Continued from April Issue.)

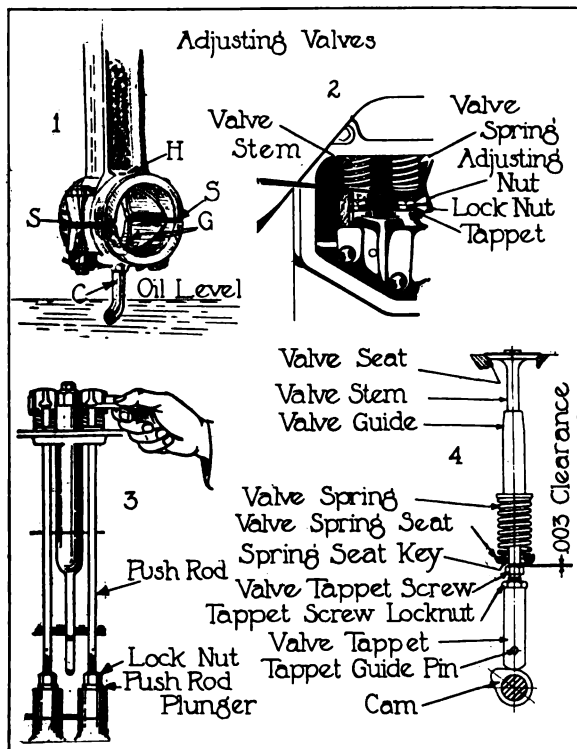
CONTINUING the discussion of the adjustment of the main bearings: Test with different thicknesses of shims till the shaft can be turned with a slight drag when the bearing cap is tightened down to its correct position. Loosen the bearing, allowing the shaft to turn freely and adjust the next main bearing in the same manner, loosening each bearing so adjusted that the drag will only be felt on the particular bearing being adjusted. Leave all bearings loose after adjusting and proceed with the connecting rod bearings in the same manner. If the bearings, upon examination, are found burned or in too poor a condition to use again, they should be renewed or rebabbitted. When this is done oil ways should be cut in the babbitt lining so that the oil can reach the



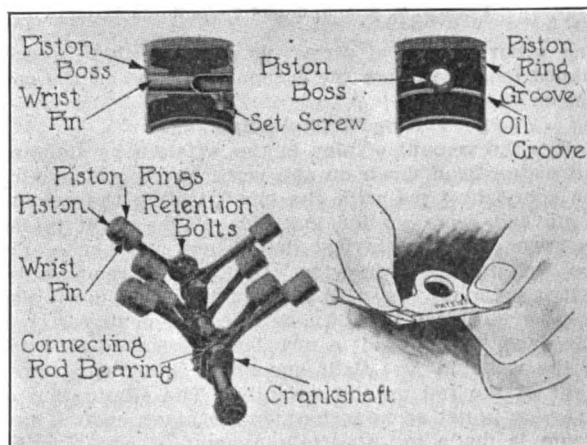
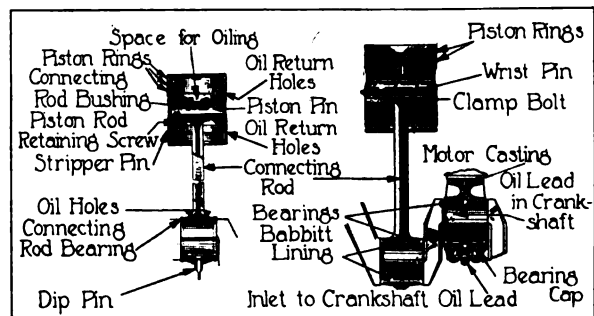
Base of Engine Removed Showing Location of Main and Connecting Rod Bearings and Timing Gears.

inner part of the bearing to lubricate it and the crankshaft. Unless it is intended to remove the pistons from the cylinders the bearings can now be set up tight against shims and nuts wired to prevent from turning.

If it is desired to remove the pistons the bearing cap is taken off and the piston slipped up through the top of the cylinder wall on the separable type engine, or drawn down by the crankshaft in the L-head, non-separable head type. The pistons are usually removed when it is desired to examine the walls of the cylinders for scores or when the wristpin bushings are known to be worn and it is necessary to rebush them. Removing the pistons also gives the repairer the opportunity to remove the piston rings and clean the carbon from the ring grooves. The rings are removed from the piston



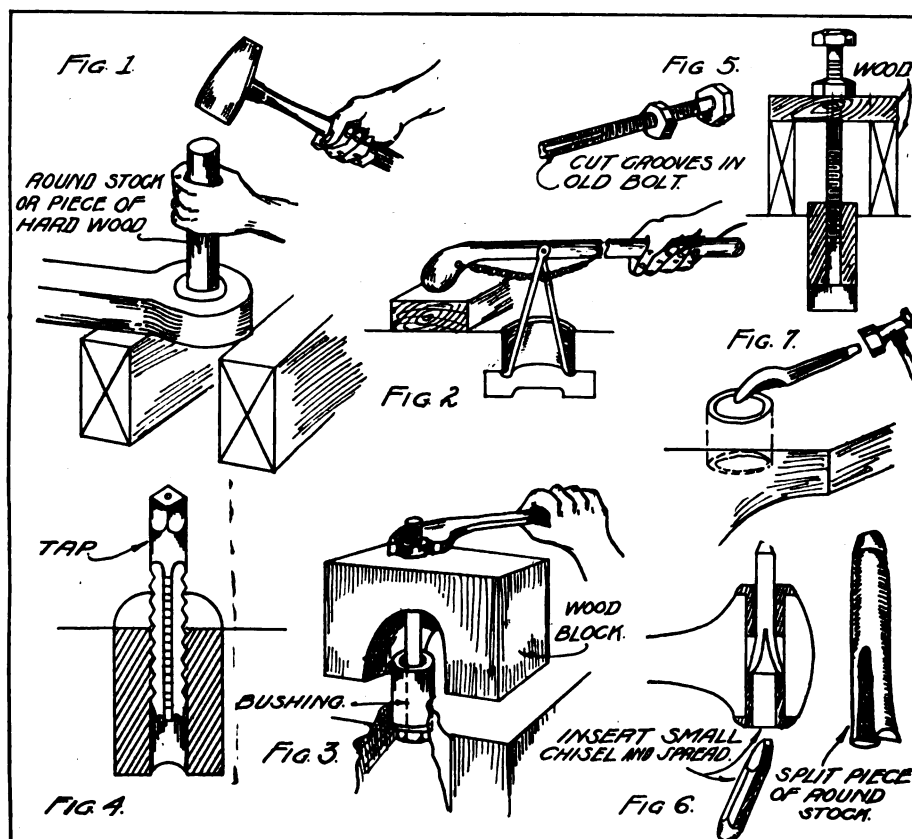
Left: 1, Connecting Rod Assembly—C, Oil Dipper; G, Oil Grooves in Babbitt Lining; S, S, Shims; H, Connecting Rod. 2—Valve Adjusting Assembly. 3—Chevrolet Push Rod Assembly. 4—Valve Adjustment. Right: Upper—Connecting Rod. Lower—Piston Assembly, Showing Location of Components and Laminated Shim Construction.



THE FITTING OF WRISTPIN BUSHINGS.

by cutting three strips of tin or brass, starting one end of the ring with a screw driver or other sharp edged tool, or with a pair of ring pliers made for the purpose that open both ends of the ring at once. With the end of the ring sprung open slightly, slip one of the metal strips under the end of the ring and slide it around towards the middle; slip a second strip under the end and do likewise also with the third strip. With the fingers slide the first ring still further along till it comes within an inch of the end of the ring; place the second strip in the center and the third at the end. The ring by careful maneuvering can now be slipped up and off the piston. Tag this ring No. 1. Repeat the process with the second ring, tagging it No. 2, and likewise with the third ring, tagging it No. 3. Tie them together and lay aside where no harm can come to them. Clean the

bosses in which are fitted the wristpin bushings. To remove the wristpin it will first be necessary to note what method is used to fasten it to the engine bosses. Different manufacturers employ different methods. For instance, one maker will fasten the wristpin at the end with a nut and washer device, another will fasten it with one set screw passing through one of the piston bosses and the bushing, while another will make use of two set screws, one in each boss and bushing. Set screws fitting the piston bosses are used principally and to reach them it will be necessary to employ either a socket wrench or two end wrenches, one fitting straight down on the head of the screw, while the second wrench is placed in the opposite end and used as a handle to turn the first wrench. These screws are locked in place with a locking nut, and this will have



Figs. 1, 2, 3, 4, 5, 6 and 7, Methods Used in Removing Bushings.

ring grooves with a screw driver or other wedge-shaped tool to remove the carbon and wipe off the carbon on the rings.

Fitting Wristpin Bushings.

Try the amount of play in the wristpin by standing the piston head down on the work bench and moving the connecting rod with the hand, testing the amount of up and down motion and side play present in the bushings. Upon this test determines whether or not the bushings need renewing. It should be remembered that it takes only a small amount of up and down play to cause quite a distinct knock when the engine is operating and to remove it a new bushing should be fitted to the wristpin just tight enough to allow free movement of the rod on the wristpin. The elimination of end play is not so important, for in many engines provision is made for a certain amount of end play between the upper bushing of the rod and the engine

bosses. It is well to obtain new bushings from the factory making the car or one of its service stations. They are fitted to the piston bosses before reaming, making them a tight fit in the bosses. A reamer is used to adjust them to the size of the wristpin and this tool can either be of the expanding type or one of the straight reamers purchased from a supply house.

Both bushings should be reamed at one operation to have the openings align. These openings should be just a trifle larger than the wristpin to allow it to be easily inserted. A driving fit should not be necessary, but possibly it will be necessary to use the hammer, tapping lightly, to force the wristpin into place. As most of the wear takes place in the connecting rod top bushing, it will probably be found necessary to renew this bushing also. The operation is similar to that for the bushings in the piston bosses, allowing the bushings somewhat more freedom of movement than for those in the bosses. If the holes are not already drilled in the piston boss bushings, they should be bored and tapped the same size as the set screw used for fastening them to the bosses.

Assembling the wristpin to the bushing and the connecting rod is the reverse operation to that employed in disassembling, taking pains to have all nuts and bolts tight as each assembling job is completed.

Fitting Piston Rings.

The fitting of the rings to the pistons requires patience and some ingenuity on the part of the repairer. The same strips of metal are used for replacing as for

THE FITTING OF THE PISTON RINGS.

removing the rings and they are positioned on the head of the piston as in removing, but the ends are bent over on the piston head so that the rings will pass over readily. Take ring No. 3, locate it with relation to the pin in the groove, spread the ends slightly so that it will pass over the head of the piston and the metal strips and slip it down the side till the groove is reached, then drop it into the groove and remove the strips. Do the same with No. 2 and No. 1 rings. With the rings in position the piston is now lowered into the cylinder connecting rod first. When the rings reach the top of the cylinder they will have to be compressed with the hands till the ring slips into the cylinder.

Some pistons will go in easily while others, due to the stiffness of the rings, will have to be compressed either with a string or wire tied tightly around the ring and removed as the ring enters the cylinder. Be sure to have the rings in the same position as when removed from the cylinder, and if any are found to be worn excessively or scratched, they should be renewed. Oil the rings and pistons before installing in the cylinder, so that they will be lubricated when the engine is started.

Fitting new rings to the piston is fussy work and is best done by the experienced repairer but, for the benefit of the novice, it will be explained.

Rings purchased from the factory will usually go into place without much fitting being required, but other rings will require considerable adjustment before they fit the grooves correctly. The best way to proceed is to choose three rings and fit them one at a time to the ring grooves, taking the ring in the hand and rotating it around the groove.

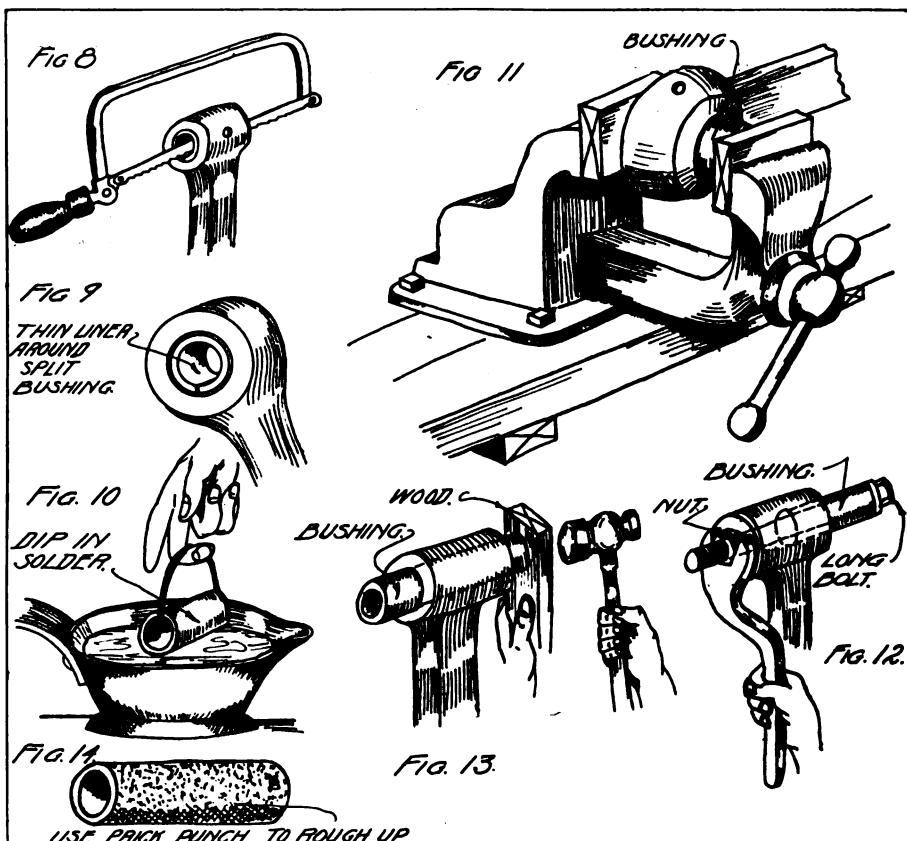
One will find that there is considerable variation in the different grooves due to the wear of the previous rings, and that a ring that will fit one groove will not adjust itself to another. Testing them in the manner stated gives the repairer a chance to choose those that are best adapted, and these are fitted one at a time to each groove by dressing the sides with a piece of emery cloth fastened to a flat board till the ring when rotated fits the groove with a slight drag at the edge. The ends are next tried by fitting the ring direct to the slot and forcing the ring and piston into the cylinder. If a ring is too large to enter, the ends are too long and must be dressed off with a file till the ring will enter easily, allowing it to expand against the cylinder walls, giving sufficient opening at the ends of the ring.

To make a perfect job of adjusting the rings they should be lapped to fit the cylinder walls, although many repairers omit this on account of the extra time

taken and also because they realize that the rings will shape themselves to the walls after a few hundred miles of operation.

Many methods have been described for carrying out the work of lapping, but probably as simple a device as any that can be procured by the home repairer is made from a turned block of wood several inches long and about the diameter of the piston. A handle is fitted to the lower end provided with a cross bar for turning the block. The ring is fitted in a groove cut in the upper end of the block of the same diameter as that of the piston ring groove and is held in place by a cross piece of wood across the end of the block and secured by a screw to the center of the top.

The ring is coated with carborundum paste and ground with an up and down motion of the handle for



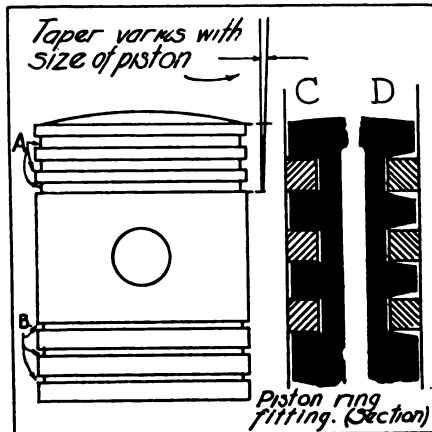
Figs. 8 and 9, Cutting Bushing with Hack Saw; Fig. 10, Immersing Bushing in Melted Solder to Make Bushing Fit Snug; Figs. 11, 12 and 13, Fitting New Bushings; Fig. 14, Roughening Old Bushing to Make Tight Fit.

several minutes, when it is removed, the abrasive wiped off and new abrasive smeared on the ring and the operation repeated.

All abrasive must be carefully wiped from the wall of the cylinder and from the ring before the piston is replaced. Treat each new ring in this manner and the engine, when tested out, will be found to have nearly perfect compression and the passage of unburned fuel or oil will be prevented from passing by the pistons. Scratches in the cylinder walls can be filled by the silver plating process if they are not too deep, while scores that are too deep are best removed by regrinding the cylinder and fitting oversize pistons and rings, or by purchasing and installing a new cylinder if cast separately or a block of cylinders if cast en bloc.

In assembling the engine use care to have all nuts

ASSEMBLING OF ENGINE BASE.



Left: A, Piston Ring Grooves; B, Oil Grooves; C, Correct Method of Fitting Rings to Grooves; D, Incorrect Method. Right: A, Dressing Edge of Ring with File; B, Dressing Ring with Carborundum and Oil.

and bolts tight, cotter pins supplied where necessary and nuts wired tightly where wire is used. As each part that requires oil when operating is replaced in the engine supply lubricant to the part when assembled as later it may be overlooked when the engine is ready to be started. Oil also helps in the assembly of individual parts in the engine.

In replacing the head gasket under the separable head, care should be taken to see that it is not damaged or broken. These gaskets are made of asbestos faced with copper and occasionally they become damaged either when being removed or by the gas blowing holes through them. If damaged they had better be renewed. These gaskets do not necessarily require shelacing. Many repairers feel that a better job is the result when they are, while others hold that it is necessary and makes the gasket difficult to remove when the head is again taken off. Gaskets can be fitted either way, the main point being to have them gas tight after the head nuts are tightened down on the separable head. The valve plugs are screwed into place with the gasket underneath and it is necessary that these gaskets be in good condition, otherwise they will leak.

The engine base is assembled in the reverse order from what it was disassembled, gasket packing being fitted between the two halves, if required. Some manufacturers employ a wicking at this point, fitting a groove around the edge, while others use a flat gasket between the edges. In either case examine the gasket and if worn, frayed or broken, renew it, otherwise oil from

the crankcase will work out.

The timing gears and timing gear case will require cleaning and examination. This case is located at the front end of the engine, the lower edge of the cover fitting around the crankshaft. To remove the cover it will be necessary to take the fan assembly and fan from the engine. Loosen and remove the bolts in the case. Remove the fan pulley from the crankshaft and the oil washer and oil rings surrounding the crankshaft in the rear of the pulley. The cover can now be taken off, exposing the timing gears, or the sprockets and chain drive of

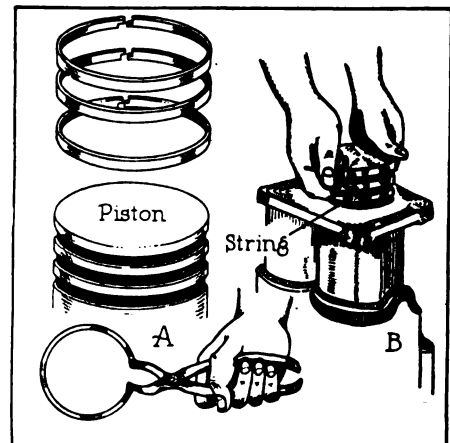
the camshaft and pump, as manufacturers use either one or the other of these drives.

Clean out the old lubricant with gasoline and a brush. When clean, examine the gears for broken or chipped

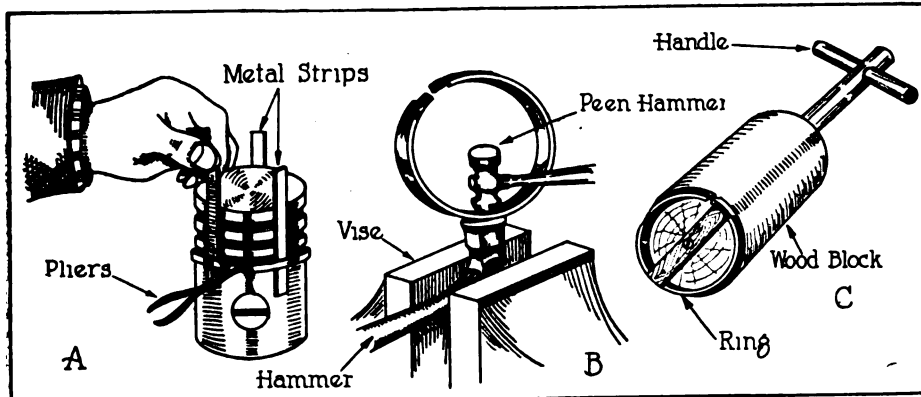
teeth. If any are found they should be removed and new gears supplied, or the old gears repaired. Chipped gears can be ground to a bevel at the edge, provided the chipping is not extensive and the gears will function as well as ever.

Gear teeth that are chipped in the center may do their work without undue noise, but the better way is to make sure and fit new teeth or supply new gears.

To remove either the pump or camshaft gears the



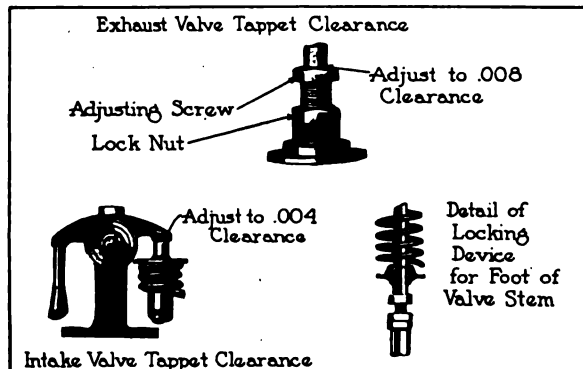
A, Piston Ring Expanding Pliers, Used for Placing Rings in Grooves; B, Replacing Piston in Cylinder, Contracting Rings with String.



A, Removing Piston Rings from Piston, Using Three Metal Strips and Pliers; B, Peening Piston Ring to Expand It. C, Home Made Piston Ring Lapping Tool.

nut on the end of the shaft is loosened and the washer removed. The gear is then pulled off with a gear puller, as they are held to the shaft with a Woodruff key in most instances. Take note of the gear marking relative to the timing of the valves, before removing a gear, so that it can be replaced in the exact spot from which it was taken when reassembling. These marks are very important, especially on the camshaft gear, as from them are determined the correct open-

INTAKE AND EXHAUST MANIFOLD.



Valve Adjustment: Left, Overhead Type; Top, L Head; Right, Cadillac Eight.

ing and closing of the valves. They are usually small prick punch marks, made on tooth of one gear at tip and corresponding mark being placed at the bottom between two teeth of the meshing gear. Marks will also be found on the camshaft gear corresponding to similar marks on the pump shaft gear. These should be noted and used when reassembled. Timing sprockets driven by a silent chain can be adjusted, as the sprockets are marked in such a manner that they may be identified readily. The camshaft sprocket is marked with a C, which should be opposite the key way in the camshaft. To install the chain the proper position turn the crankshaft over until the mark "1-4 up" on the flywheel is in line with the punched mark on the rear engine supporting arm. Next turn the camshaft until the mark "1" is on the center line between the crankshaft center and camshaft center, as shown in the illustration. Next turn the timer shaft until the distributor short-circuiting member or movable contact member is in line with the terminal of the spark plug wire leading to No. 1 cylinder. No. 2 on the timing shaft sprocket should be on the center line between the timer shaft center and the camshaft center. The chain may now be placed in

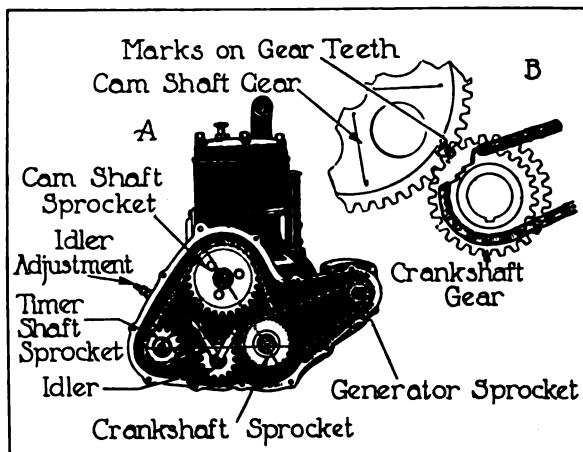
position around the sprockets and the master link installed and fastened in place. If the marks on the sprocket should be obliterated the timing of the engine should be left to a competent repairer.

The directions given above relate to the Overland car model 75 B of 1917 and although they may not fulfill the conditions found on all cars using a chain to drive the camshaft and generator sprockets, yet they are typical of a great many cars which employ this method of drive.

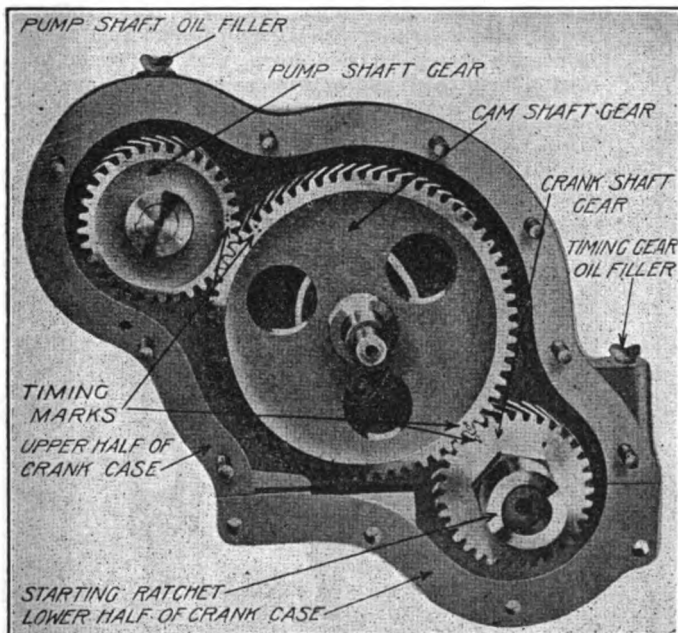
Care should be taken to see that the marks correspond and that all bolts and nuts are tightened properly when reassembling the gears or sprockets and the covering for the case. Replace the oil rings and felt washers, the fan pulley and the fan assembly.

Intake and Exhaust Manifold.

Examine the joints of the intake and exhaust manifolds for leaks or loose fitting bolts. Loose connections in the intake manifold will cause the engines to take in



Timing Gears, Chain Driven: A, Overland Showing Location of Timing Marks, 1-1, 2-2 and Idler; B, Timing Marks, Overland Country Club.



Timing Gear Assembly, Buick Four Cylinder, Indicating Timing Marks.

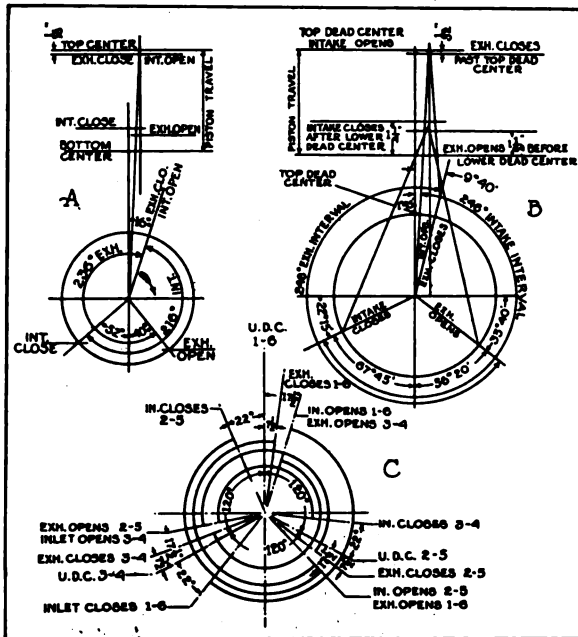
more air than is required with the inrushing gas mixture, thus weakening the mixture, causing the engine to run sluggishly and sometimes to miss explosions. All gaskets that are frayed or blown should be renewed and the joints tightened by drawing down the nuts on the bolts.

Oil Pump and Screen.

In the lowest point in the oil reservoir is located the oil pump, which lifts the lubricating fluid from the reservoir and circulates it to the bearings of the engine either by splash or pressure. The amount of oil thus forced to the bearings is shown by the oil indicator fastened to the front of the dash. In some older types of engines the pump is located at the side of the engine and is operated by a cam on the camshaft, drawing the oil through a suction tube passing down into the reservoir. The pump usually takes the form of either a plunger operating in a cylinder or a pair of gears enclosed in an oil tight case and driven by a rotary shaft. In either instance the drive is taken from the camshaft either through a worm and worm gear or, in case of the plunger pump, by a cam located on the camshaft.

The gears of the geared type pump rarely ever need attention, except for an occasional cleaning to remove sediment. The plunger pump requires very little atten-

CARBURETOR, GENERATOR AND STARTING MOTOR.

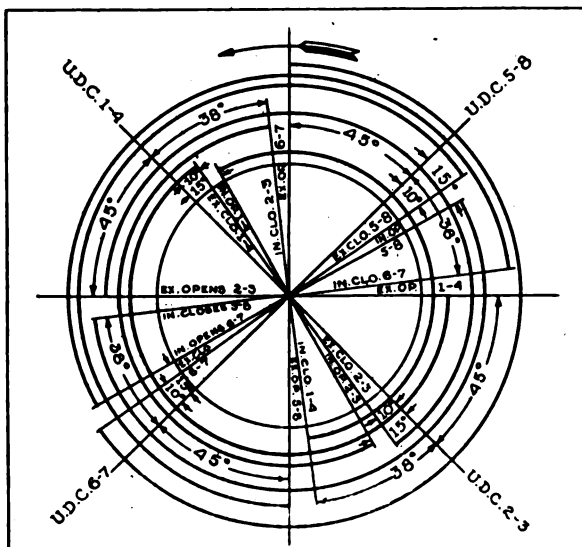


Valve Timing Diagrams: A, Chevrolet 490; B, Chevrolet Fa, Fb, T. C. Modern Six-Cylinder Engine.

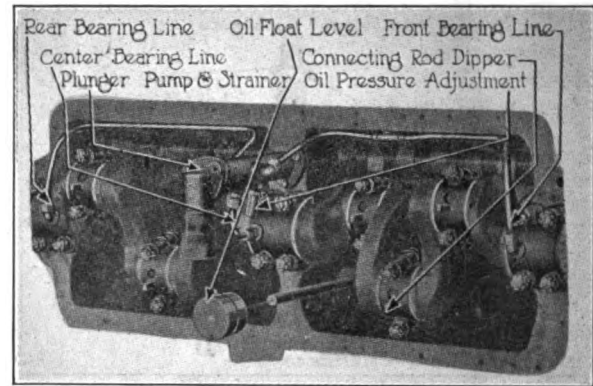
tion and at infrequent intervals the supplying of new packing at the top of the cylinder around the plunger. The part that does need attention is the wire screen that encloses the suction tube. This screen becomes clogged with sediment quite frequently, which prevents the pump from taking the required amount of oil from the reservoir. This screen should be removed during the overhauling of the engine and cleaned with gasoline or kerosene. To take it from the reservoir, remove the bolts fastening the cap to the base of the reservoir. The screen is then withdrawn through the opening and cleaned by immersing in a pan of gasoline or kerosene.

The Carburetor.

It is very rare that the carburetor will need attention, provided that the car has been running perfectly before overhauling operations are started. All that will



Valve Timing Diagram: Modern Eight-Cylinder Engine.



Lubricating System: Modern Pressure System, Forcing Oil to Bearings of Engine.

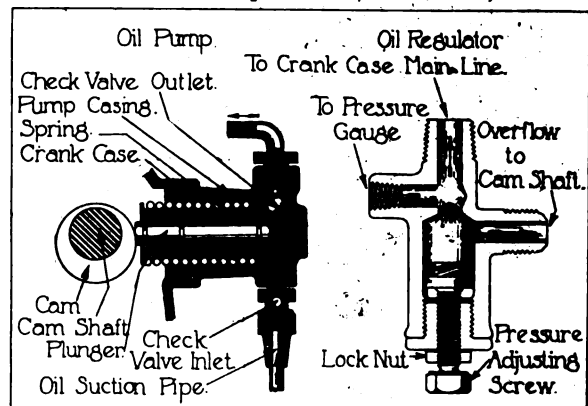
be necessary, in most instances, is to remove the carburetor and intake manifold intact, laying them one side, taking care not to disturb the adjustments. The gasoline fuel pipe is disconnected and also the connections to the dash, foot boards and engine, tagging the connections so that the carburetor and its fittings can be easily installed when assembling the engine.

In case the carburetor should require adjusting at the time of reassembling, the better method is to call in the services of some good service station man who is familiar with the make of carburetor. It is impracticable to give directions that will cover all makes of carburetors, as there are so many types on the market and the methods of adjustment differ widely.

Generator and Starting Motor.

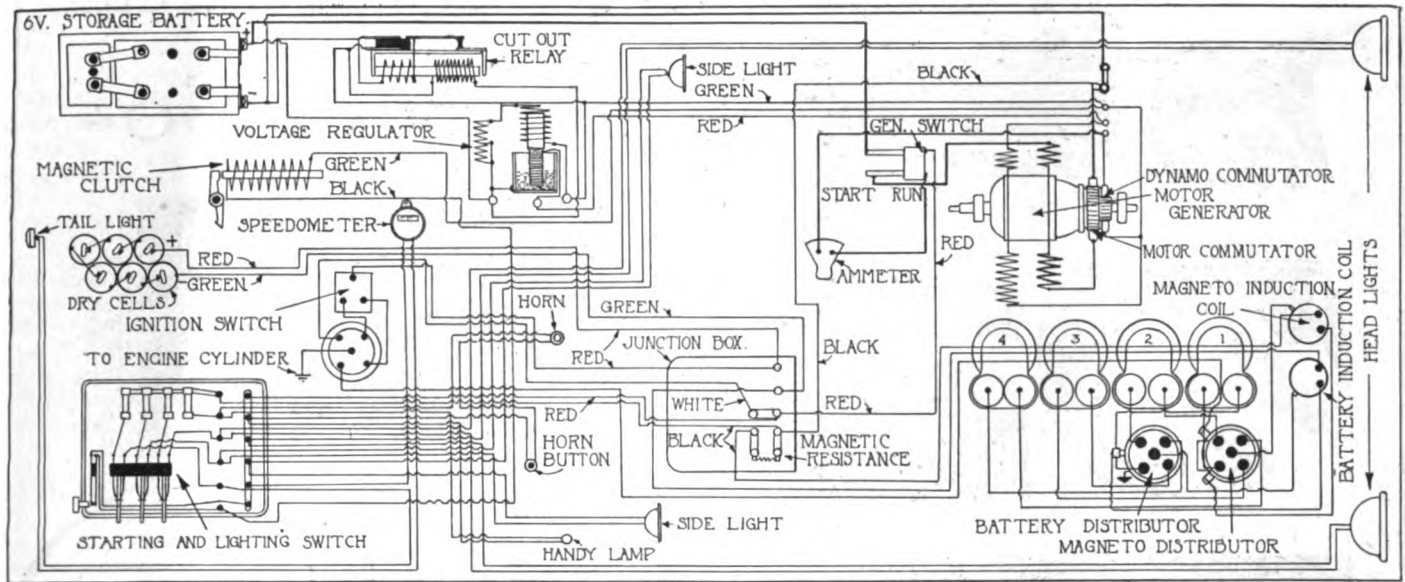
Unless well informed in the construction and maintenance of the electric generator and starting motor, the motorist repairer will have better results by having the necessary work on these units performed at the service station, or to remove and send them to the factory. Certain jobs can be done by the repairer, however, such as cleaning the commutator, refitting new brushes, cutting down mica, etc. The commutator is cleaned with a strip of No. 00 sand paper, held against the commutator, sand side down, with a strip of wood about $\frac{3}{8}$ inch thick and as wide as the sand paper strip fitting firmly against the segments of the commutator.

(To be continued in June issue. Copies containing these discussions should be retained, as all the installments will form a complete overhaul review.)

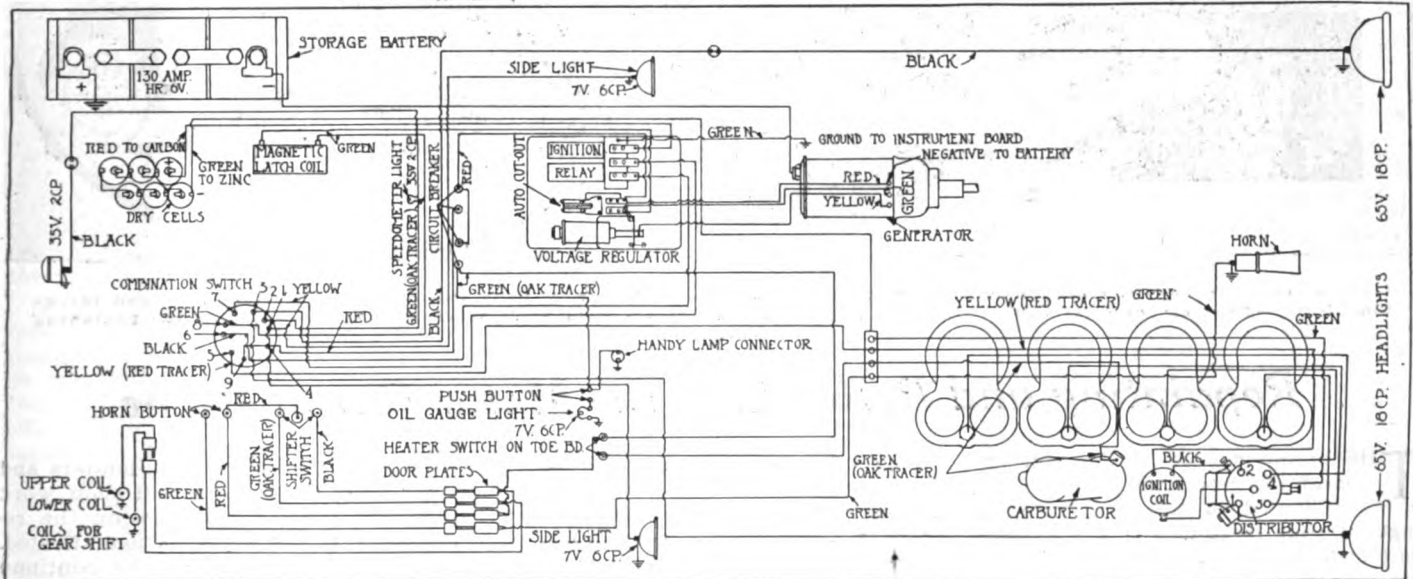


Left, Pump Plunger Operated by Cam on Camshaft; Right, Oil Pressure Regulator, Showing Adjustment.

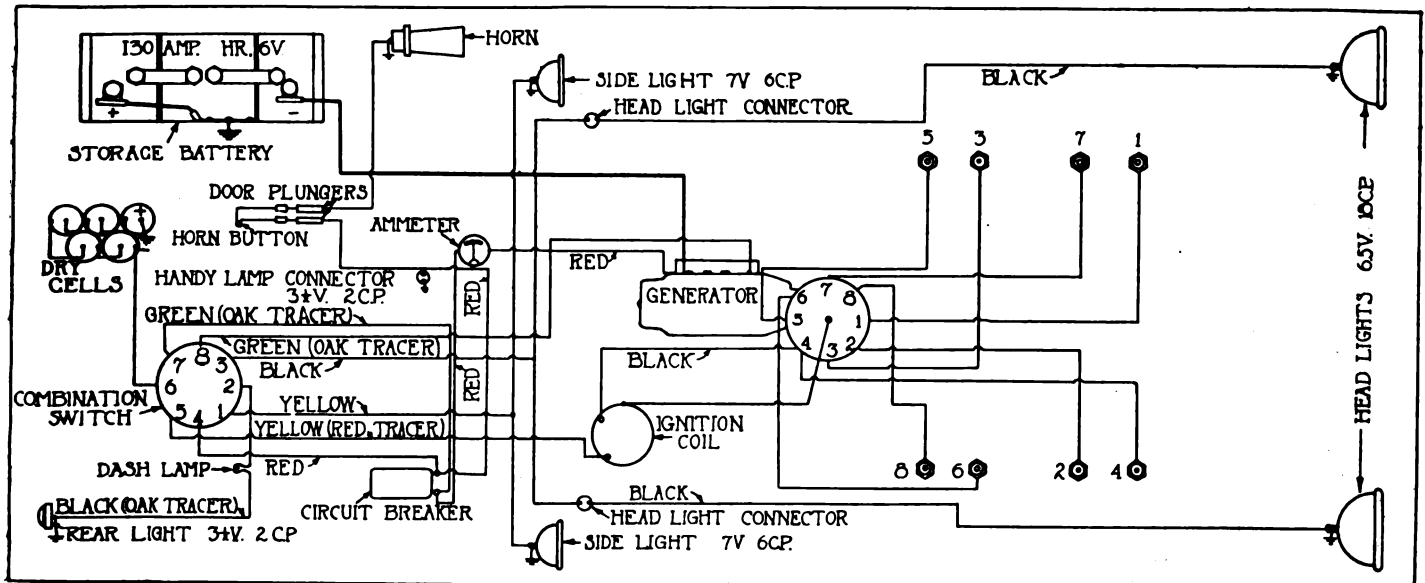
Monthly Wiring Diagram, No. 5



Cadillac, 1913, Four Cylinders—Delco One-Unit Two-Wire System, Starting, Lighting and Ignition, Equipped with Two Separate Distributors.



Cadillac, 1914, Four Cylinders—Delco One-Unit One-Wire System, Starting, Lighting and Ignition, Electric Gear Shift.



Cadillac, 1915, Model 51, Eight Cylinders, Delco One-Unit One-Wire System, Starting, Lighting and Ignition.



1—Washing Body Panels, Using Sponge and Running Water; 2—Sandpapering Body Panels to Remove Roughness and Irregularities; 3—Flowing On First Coat, Color Enamel; 4—Rubbing Down with Steel Wool or Moss; 5—Applying the Finishing Varnish.

Repainting and Refinishing the Motor Car at Home

THE spring months of the year are ideal for repainting the car that is housed in the back yard garage. During these months the motorist will undoubtedly have considerable leisure time, which he can profitably employ in this manner and if he undertakes the job with some idea of how it should be done and what is required in the way of stock the result should be highly satisfactory to the motorist in many ways.

The job of repainting and refinishing an automobile is looked upon as unavoidable, requiring the outlay of from \$25 to \$100, depending on the size of the car and the quality of finish desired. In connection with it there is also the annoyance and inconvenience of having the car out of service for a period of from one to two weeks and possibly longer, just at the season of the year when weather conditions are ideal for motor-ing.

Beyond any question of a doubt it is mistaken economy to let the car go unpainted when it needs it. Just stop and figure what value in dollars and cents the depreciation of an automobile represents in one year's time or a season's use. This is probably greater than that involved in any other investment being made in this country at the present time.

To a certain extent this depreciation can be decreased by proper attention to the upkeep and care of the automobile. Loss through depreciation due to lack of attention is money out of the owner's pocket perhaps not realized until the time comes when he may wish to exchange the car or is forced to put it on the market for what it will bring. Unpainted steel will rust; unpainted wood surfaces will become scuffed, stained and permanently marred if allowed to remain in that condition. An unpainted, weather beaten car put up for sale will not bring anywhere near its actual value regardless of its mechanical condition. An investment in a good job of painting on the automobile will add more to its value than what it costs. It lays within the scope of every owner to keep his machine in first class, tip-top condition, both as to outward appearance as well as to its mechanical operation.

Frequent Supervision Advocated.

A frequent, though even superficial, inspection of the mechanical parts of the machine may reveal adjustments needed which if made in time, will prevent costly repair bills later on. The same thorough inspection of the outside finish of the machine will reveal rust spots and abrasions which, in the thin metal

covering of the body and its fenders and other sheet metal parts, will soon work their way through, necessitating the replacement of the whole section affected. If this condition is allowed to continue without attention for any length of time the machine will reach a point where extensive replacement of rusty parts will be an absolute necessity, costing heavily, or as is probably the case in nine cases out of 10, the car is put on the market for the best price it will bring and its value sacrificed through its unfavorable outward appearance.

The car owner who is inclined to take an interest in his machine and who does not object to putting on overalls and jacket and doing a little work in odd hours at home and who is competent to revarnish a chair or enamel a picture frame, can successfully repaint and re-finish his automobile; can do it easily, quickly and properly, utilizing the very best quality of enamel and finish for the purpose which can be bought from any reliable dealer in automobile supplies or even direct from the manufacturer who specializes in a finish of this character. Not only that, but the small amount of material needed in repainting a machine enables the owner to buy a better grade than perhaps in nine cases out of 10 was:

originally put on at the factory.

Preparation of the Surface.

Enough material to repaint and refinish an ordinary sized light car to do a first class two-coat job can be bought for \$6 to \$10, according to size of car. This should include a heavy bodied first coat enamel, a heavy bodied finishing varnish, sufficient top dressing to refinish the top and the tools and equipment to work with. The labor cost of course would be done away with.

The first consideration is to get the surface in a fit condition to receive paint or enamel. This should consist first of a thorough washing of the surface, including the under side of the fenders, frame, rods and metal parts with a hose and plenty of water. This should be followed by going over the surface with a large rag soaked in a good soap suds and followed by another rinsing with the hose. When dry the car will then be pretty clean, with the exception of the hubs, rods and parts where oil usually drips. It is well to drain the oil out of the crankcase and take a scrubbing brush and some gasoline or benzine and go over carefully any surface that has a suspicion of being grease coated. The benzine will cut the grease almost immediately and it can be washed off afterwards with a rag and clean benzine.

The next step is to go over the entire surface of the car with sandpaper, emery cloth or steel wool, the object being to scour the oil surface, to smooth it up and to cut away the old gloss, thus putting the surface in a fit condition to receive the new paint and enamel.

Steel wool can be purchased from any good retail paint dealer and a good big handful or a few ounces is sufficient to go over the job and the work can be done very quickly. Next to steel wool in efficiency is emery cloth, and in the absence of either, ordinary sandpaper will do. Use a fine grade of any one of the three to avoid deep scratches and in rubbing the surface, rub one way only. It won't take more than an hour to thoroughly scour the surface and get it in good shape to paint. After this scouring operation is completed, dust off the surface, or if possible, give it a good washing off with the hose, which will remove all the dust and grit and then the job is ready to paint. Getting the car in condition to paint is the secret of success. It will probably take longer to do this than to actually paint the car, but if proper attention is given to the detail of making ready, results will be exceedingly satisfactory.

Applying First Coat.

In repainting the machine the work ought to be done in the garage with the doors closed. Sprinkle the floor with an ordinary garden sprinkling can to keep down the dust while moving around. Open the paint and stir it, soak the brush in turpentine first and shake it out, but do not wipe it on any surface, as it will take up grit and specks. Take a brushful of first coat paint or enamel and go to work on the body. Begin at one side and work around. Do not be afraid to use plenty of the paint and get

it on the surface as rapidly as possible and after you have done a panel or a section, stop and slick it up. By this is meant to catch up with the brush any drips or sags or runs. If you will watch a practical painter use varnish or enamel, you will see that he almost pours it on the surface and depends upon the slicking up operation to leave it smooth and level. Varnish or enamel will set or level itself if given a chance, but in applying a finish heavily, it is necessary to stop every so often and slick up what has just been done to prevent sags and runs. A little care in handling this detail is always necessary.

Rubbing Down with Sea Moss.

When the first coat has dried from 24 to 36 hours, take a handful of sea moss, which can be purchased from any good hardware or paint store, go over the surface lightly, merely to kill or destroy the gloss, so that the following finishing coat can get a good grip on the surface of the first coat. It is not necessary to rub the first coat finish, in fact it would be unwise to do that. Merely go over the surface quickly and lightly with the sea moss, which is soft and looks something like excelsior, and it will be found that by rubbing quickly and lightly the brilliancy of the gloss of the first coat finish can be taken away and it can be left with a dull appearance and also without scratches, as the sea moss is very soft and smooth.

Applying the Finishing Coat.

As soon as this operation is completed, dust off the surface and remove any particles that might remain from mousing it, and apply the finishing coat. This should be put on the same way as the first coat, care being taken to slick up each section to prevent runs or drips. Special care should be observed in doing the panels of the body as these large, smooth surfaces will show up imperfections more than other sections. It is not necessary to take the machine apart or to remove the wheels in order to do the job properly, although it would be convenient to take off the wheels in getting at the under side of the fenders. It is important that the rods, springs and all running parts should be gone over with at least one coat of the finish, preferably both coats.

Assuming that the car is now completely painted, two coats, close the doors of the garage carefully and keep them locked for at least 24 hours, at the end of which time your car can be run out and used. The whole process of repainting the car two coats should not occupy over three hours time spent in labor and this is divided between the operations of cleaning up, applying the first and finishing coats; nor should it keep the car out of service for over two days and a half to three days as against two or three weeks and sometimes a month when done by a professional painter.

Amount of Material Required.

In purchasing the material to do the work, only a small quantity is required and the owner can afford to buy the very best. It is important that this be a quality guaranteed by a reputable manufac-

turer and preferably one who is in a position to supply the complete equipment for finishing a car, including first and second coat, as well as top dressing, together with detailed instructions for using the finish.

Some painters maintain that an automobile surface, in being repainted ought to be built up with a lead and oil under coat. This is not in accordance with the best modern practise in respect to automobile work. Those experienced along these lines strongly advise to keep lead and oil off of the job, as well as rough stuff, filler, etc., and to steer clear of patent paint in small cans that are claimed to be useful for every purpose, including picture frames, floors and bedroom furniture. An enamel or paint suitable for refinishing an automobile must be made especially for that purpose, of a very much higher quality of material than is usually found in paints for household use.

To sum up, at an investment of from \$6 to \$10 for material the owner of an automobile can repaint his car and put an increased value on it of \$50 to \$150, with a small amount of labor and a very small loss of time.

It pays to repaint before you resell. It pays to repaint to save depreciation. It pays to repaint for appearance sake, because every one should want to look prosperous.

CLOGGED MUFFLER.

A clogged muffler is a distinct cause of loss of power. When the constricted passages inside the muffler become clogged with carbon or soot, a back pressure is set up and the engine has to work against this pressure. Tap the muffler several times lightly with a hammer, then start the engine and blow out the loosened carbon. Occasionally the muffler should be taken apart and thoroughly cleaned of carbon, and the small holes in the baffle plates opened up with a pointed tool.

TO LOOSEN RUSTED SCREWS.

One of the simplest and easiest ways of loosening a rusted screw is to apply heat to the head of the screw. A small bar of iron, flat at the end, if reddened in the fire and applied for two or three minutes to the head of the rusted screw will, as soon as it heats the screw, render its withdrawal as easy by the screw driver as if the screw had been recently inserted.

CLEANING SPARK PLUGS.

Spark plugs require cleaning occasionally, especially since engine fuel became as low grade as it is at the present time. The proper way is to take the plug apart and clean all the black, carbonized oil and dirt away from the junction of the metal and porcelain. The porcelain must not be roughened with sandpaper or a file, as this makes it more liable to accumulate carbon. The points should be brightened with emery cloth and the rest of the plug be treated with gasoline and a brush.

Becoming Acquainted with Motor Car and Components

TAKING it for granted that you have just bought your first car, whether new or a so-called renewed car, which has been repainted and fixed up to sell again, do you know just what it is

ferential, a gear device which permits the two parts to turn at different speeds when going around a corner. This is necessary, since the outer wheel in turning travels a greater distance than the

on the bow of a boat and makes steering easier. Neither the foregather nor undergather are excessive, and there is but slight wear occasioned, which is offset, however, by the advantages of keeping a straight track. A steering wheel and its mechanism control the front wheels.

Brake drums are attached to the rear wheels, with inside and outside bands and appliances to tighten them against the drums, affording friction to slow down or stop the car. These are connected to levers and pedals for use by the driver.

Engine and Radiator.

Upon the chassis frame forward rests the engine, bolted to it. Forward of this is the radiator if it be a water cooled engine, with connecting pipe to the engine water jacket. The cooling system may be by pump or thermo syphon, and in a few cases the engines are air cooled. The aim is to keep the engine just cool enough to keep the lubricating oil from burning on the cylinder walls.

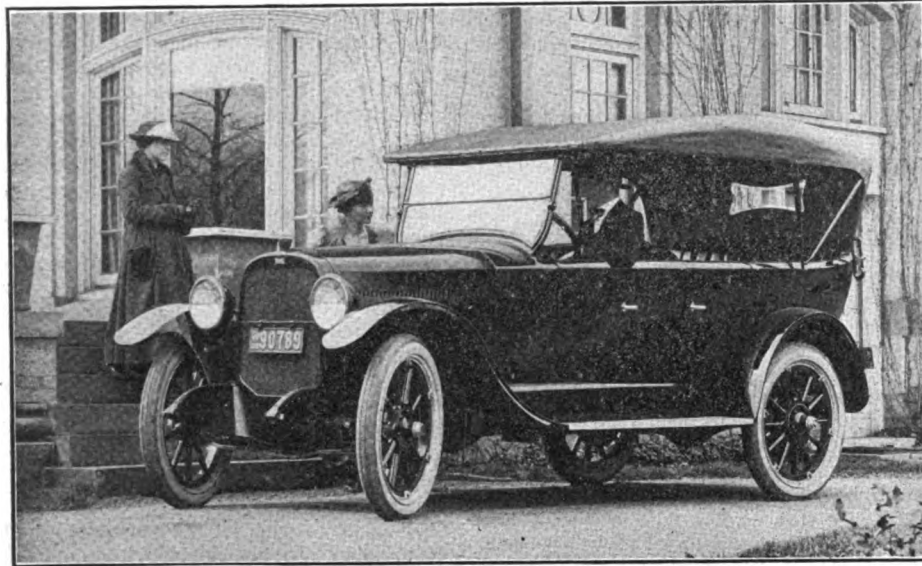
To prepare the fuel for the engine there is a carburetor, which mixes air and gasoline in proper proportions, the supply of gasoline coming by pipe from the fuel receptacle, into which by suction from the intake manifold the fuel is drawn from the main tank and is then fed by gravity to the carburetor. Levers give the driver control of the fuel supply.

To ignite the fuel there is a battery and coil or a high-tension magneto with its own coil and distributor, or a combination of both, controlled by a lever on the steering wheel. When the electric starter is used there is a storage battery operating the starting motor and ignition and charged by a generator. Usually the latter has a circuit breaker and distributor, though some times there is a separate magneto and coil.

Lubrication is supplied by a splash system or by gravity or a force feed oiler system, with pipes leading to the bearings. In the splash system, projections on the connecting rods dip into the oil and splash it over the internal parts.

Construction of Engine.

The engine consists of one or more cylinders, each provided with a piston with rings attached to seal the cylinder



The Modern Motor Car Is a Thing of Beauty as Well as a Recognized Utility.

that you have purchased? If not, you have a lot to learn. Whether it be a palace on wheels done up in a limousine package or a popular priced "flivver," it resolves itself simply into a steel frame on wheels, upon which are placed an engine with devices for connecting it to the rear or drive wheels, a fuel tank, an ignition system, certain levers and pedals to regulate the engine speeds, a steering wheel and its connections. Also there is some sort of a body with seats for the driver and passengers. It may have a great many more components of one sort or another, but unless it has all those enumerated, the car will not get very far, but occasionally you see a car in good running condition with little equipment beyond the list given.

The motor car is named an automobile because it contains its own propelling force and does not require to be drawn by a horse or other power.

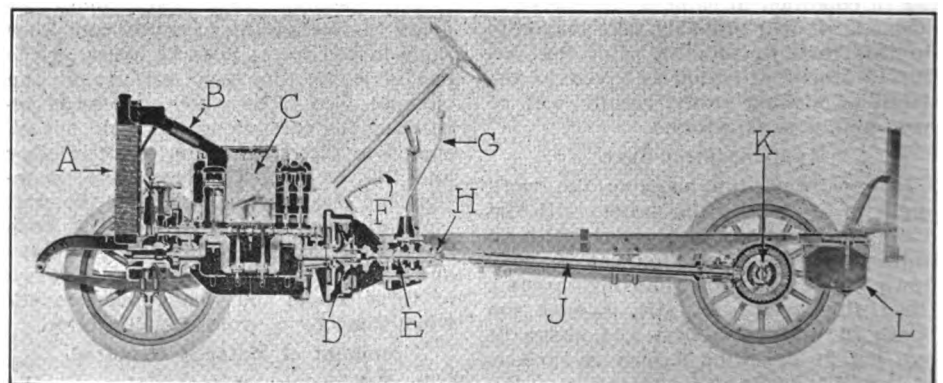
To explain more fully your purchase, you have a chassis, which includes the running gear and engine, surmounted by the body. The chassis is made of angle iron or steel, usually riveted into a shape designed to carry the other parts. The steel frame rests upon springs to partly absorb road shocks; the springs bear upon the axles. On the axles are wheels provided with tires, constructed of such materials as to absorb more of the road shocks. And for comfort, incidentally you will need well padded and springed cushions to further neutralize the effect of the omnipresent road shocks.

Axles and Differential.

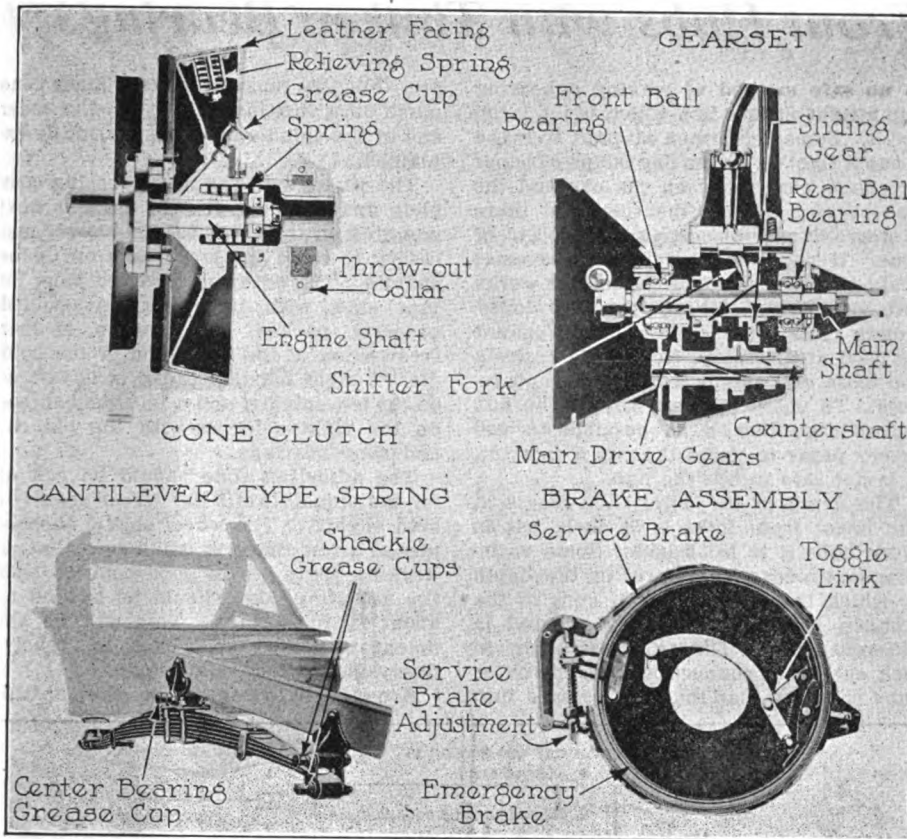
The axles, unlike those on a wagon, are both rigid, that is neither the front nor rear member swings for turning. The rear axle is in two parts, revolving in a housing and joined in the center by a dif-

inside and were there no allowance for this the tires would drag over the ground and be subjected to excessive wear. The differential housing is kept from twisting by a torque tube or rod, which is attached to the frame. To keep the rear axles at right angles to the frame radius rods are provided to hold them to the frame.

The front axle really forms a part of the frame and the axles proper consist of steering knuckles suspended in a yoke at the ends of the so-called axle and the wheels turn on tapered spindles forged as a unit with the knuckles. The latter are connected with a tie rod, which makes them act together, and a turn buckle keeps the wheels approximately parallel. They are not exactly parallel, however, since they are undergathered to bring the load over the center of the knuckle for strength, that is, the wheels are at a slight angle to prevent them from wobbling. This brings a slight pressure on each wheel similar to that of the water



Sectional View of Chassis: A, Radiator; B, Water Connection to Engine Water Jacket; C, Engine; D, Clutch; E, Gearset; F, Clutch Pedal; G, Gear Shift Lever; H, Universal Joint; J, Propeller Shaft; K, Rear Axle Drive Gears and Differential Gears; L, Main Gasoline Tank.



Four Important Units of the Modern Passenger Car.

with the aid of oil; the pistons are connected to the crankshaft with connecting rods, the explosion in the cylinder forcing down the piston, thus turning the crankshaft and producing rotary motion. The flywheel by its momentum carries the crankshaft over the strokes, making the motion continuous.

Devices for Supplying Power.

To supply the power to the driving wheels several devices are employed. First is the clutch, which serves to apply and cut off the power by friction in some form without stopping the engine. The most common are the cone clutch and the multiple disc clutch. To provide for varying speeds and reversing and extra power when needed, gearsets are introduced. This is a train of cog wheels of different sizes arranged on parallel shafts. Engaging different sets of gears gives varying speeds forward, or a reverse motion.

From the gear case the power is transmitted by the drive shaft, with one or two universal joints to take up the angle between the engine level and rear axle level and the variation due to spring action.

Upon the wheels are tires of rubber with a fabric casing, with a soft rubber inner tube, which is provided with a valve for inflation.

There are many lesser parts which enter into the operation of the car, but the foregoing is a general description of the makeup of the average automobile. The owner should study the manufacturer's instruction book for his particular car, since all vary in some particulars. Charts and diagrams will be found therein which will enable the owner to better understand this general description.

REMOVING RUST FROM METAL PARTS.

Cars which are stored in poorly ventilated garages during winter months are very liable to show more or less rust on the metal parts when the car is taken out in the spring. This is due to the fact that the garage being cold, moisture collects on the ceiling from frost, and during warm days thaws, causing moisture in the air, which gets in under the covering and the hood of the car, settling on the exposed metal parts, especially those on which the nickel is thin or which are unpainted. Suitable ventilation should be supplied at the first opportunity to

keep the garage free from this moisture.

To remove the rust, make a solution of one part sulphuric acid to 10 parts water and dip in it the parts that are rusted, or if impossible to remove them from the car, moisten a cloth with the solution, and rub lightly, taking care not to get the solution on the hands or clothes. Next dip them in a bath of hot lime water and keep them in it until they have become so hot that they will dry immediately on being taken out. Rub the parts with dry bran or saw dust and they will be found to be perfectly clean and may be painted with fireproof paint, blued or nickeled.

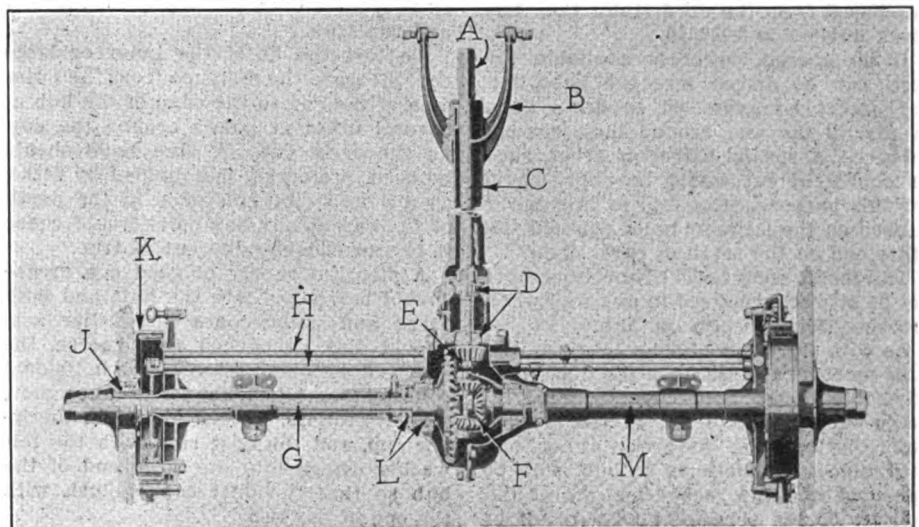
INSERTING BOLT IN FORD REAR SPRING.

A time saving method of putting a bolt through the rear spring on a Ford car is to cut a hole about three-quarters of an inch in diameter directly over the bolt head. The broken bolt can be forced up and out while the new bolt can be inserted through the hole into place in the spring without taking the spring out from under the car. In cutting the hole above the bolt leave about one-quarter of an inch of stock to act as a hinge. After the new bolt has been installed, bend this hinged piece back into position, covering the hole. Clean the metal and place on a few drops of solder after treating with soldering flux, and solder with a good hot iron. This makes a neat job and one that can be opened up again if the necessity arises.

PREVENTING INFECTION OF SMALL WOUNDS.

A small cut or scratch on the hands, if not properly cared for, may become infected and cause serious trouble. If the wound, after being thoroughly cleansed, is sealed with pyroxyline, which may be obtained in liquid form in any drug store, a film is formed over it which prevents infection.

Great care should be taken that no dirt or foreign substance is left in the wound.



Rear Axle and Torque Tube Assembly: A, Propeller Shaft; B, Driving Yoke; C, Torque Tube; D, Pinion Gear Thrust Bearings; E, Pinion Gear and Bevel Ring Gear; F, Differential Gears; G, Axle Shaft; H, Brake Shafts; J, Hub Bearing; L, Differential Thrust Bearing and Adjusting Sleeve; M, Axle Housing.

Equipping Ford Front Hubs with Timken Bearings

FORD closed models and one-ton trucks have for some time past been fitted with special Timken roller bearings, and the same bearings can also be installed in other models to replace the old cup and cone bearings, the two types of bearings being interchangeable in sets. The Ford Co. supplies the bearings in separate packages or cartons, a complete set of bearings for one wheel in each package. As the Ford spindles have right and left hand threads, it is, of course, necessary to supply adjusting cones for the outside bearings with corresponding threads. The packages containing the complete sets of bearings are plainly marked "right wheel" or "left wheel," according to the type of bearings they contain.

When installing Timken bearings in Ford front wheels in place of the old bearings, the first step is, of course, to remove all parts of the old bearings from the wheel hub, and clean out the hub thoroughly so that no grit or metal chips will be left to damage the new bearings. The shoulders of the recesses from which the ball cups were removed should be inspected carefully for high spots, which might cause the cups of the Timken bearings to set high on one side.

The stationary cone is also removed from the inner end of the spindle, as it is replaced by a special cone. Be careful to leave no rough or high spots on the part of the spindle on which the cone seats, as the Timken inner cone is not pressed on to the spindle, but is a floating slip fit. It has a clearance on the spindle of one-thousandth of an inch.

Both inner and outer cups of the Timken bearings, corresponding to the inner and outer ball races or cups of the old bearings, are press fits in the hub. The best way of installing them is to draw them both into place at once with a special puller, similar to that shown in the drawing. The large or square end of this device is held in a vise or with a wrench, while the special handle nut on the other end is turned. Tools of this type can be purchased from the Ford Motor Co. The stock number is 3-Z-2316.

If no special puller is available the cups can be driven into the hubs, but care must be exercised to drive them evenly all the way around their circumference. A special driver or arbor, such as shown in cut would be very useful for this purpose. One end of this driver is used on the large or inner cup and the other end on the small or outer one.

The inside cone faces of the cups must not be struck or marred in any way when pressing the cups into the hub.

As with the cup and cone bearings, the cups must be a press fit in the hub. It is advisable to try both cups by hand, to make sure they will not fit too loosely, before attempting to press either one into place. Sometimes a hub will be damaged and the recess for one of the cups expanded somewhat as a result of some of the balls breaking in the old bearing. If either cup of the Timken bearings is a loose fit in the hub it would be safest to install a new hub, as there

is no safe method of making a bearing cup a tight fit in a hub which is too large for it. Some repairmen attempt to make a cup a tight fit by putting strips of paper or emery cloth between the cup and the hub recess. With either material there is grave danger of getting the cup out of true. If paper is used it soon becomes soaked with grease and pounds or works out of place, leaving the cup loose. Emery cloth, on the other hand, cannot be used at all unless the cup is entirely too loose and sloppy a fit in the hub recess. To put it another way, if the hub is so large that it is possible to use emery paper to make the cup a tight fit, it is not safe to use the hub.

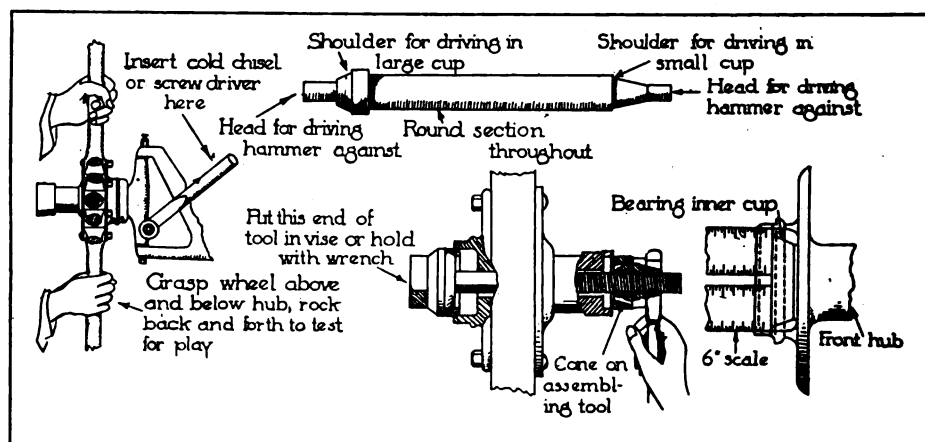
The depth of the outer race recess in the latest front hubs is $\frac{3}{4}$ inch, but in older hubs it is $19/32$ inch. Some variation may occur, therefore, in the depth to which the outer or small cups of the Timken bearing sets can be pressed in different hubs. The principal thing to look out for in connection with the outer cups is to see that they are pressed into

are. For this reason the large inner cone must be a floating slip fit on the inner end of the spindle body, as previously explained.

The wheel with the inner bearing complete and the dust ring in place is next mounted on the spindle. It is never necessary to force the large cone on to the spindle. The outer or threaded cone for that side, with its rollers assembled, properly packed with grease, is then screwed on to the outer end of the spindle. A right hand threaded cone is used on the left spindle, and a left hand thread on the right side, as with the old cup and cone bearings.

The adjusting cone should be run up on the spindle until the wheel seems to bind slightly. The wheel should then be turned a few times to make sure that all working parts are in good contact, then the adjusting cone should be backed off about $\frac{1}{4}$ to $\frac{1}{2}$ turn. This will be sufficient to allow the wheel to revolve freely but without end play.

Sometimes looseness in the spindle



Appliance Used in Installing Ford Front Hubs with Timken Roller Bearings and Methods of Application.

place evenly, and are not high at any one spot. It is unimportant if some cups project slightly beyond the end of the hub, are flush with it or set in slightly, provided they have been pressed in all the way and run true.

To test the fit of the inner or large cup, measure the distance from the outer face of the cup to the edge of the hub at several different points around the cup, as shown in cut. A fine scale should be used, preferably one divided by 64ths, as a very slight difference in the depth of the cup at any one point would cause it to run considerably out of true.

A plentiful supply of good cup grease should be packed into the hub, and both inner and outer cones and roller sets should also be packed with grease, the spaces around and between the individual rollers being filled. The large inner cone, with its rollers, is then placed in the inner cup, and the dust ring with the felt washer driven into the large end of the hub so that the dust cap is flush with the end of the hub.

It will be noted that the rollers of the Timken bearings are assembled with the cones, instead of with the cups or races, as the balls of the cup and cone bearings

body bushings may be mistaken for end play in the wheel bearings. To avoid any such mistake, insert a cold chisel or a screw driver between the jaw of the axle and the spindle to take up any play that may exist in the spindle bushings, then test the wheel for end play by working the wheel back and forth.

When the proper adjustment has been reached the spindle washer and nut should be replaced, the nut being drawn up tight and cotter keyed the same as with the cup and cone bearings. Make sure that tightening the nut to the proper notch for the cotter key does not cause the bearings to bind. Turning the wheel a few times just before the cotter key is inserted will determine this. The hub cap can then be filled with grease and replaced.

Every three or four months the hub bearings should be cleaned out, repacked with fresh grease and readjusted. The old grease should be washed out thoroughly with kerosene or gasoline to make sure no grit or metal particles remain in the hub to damage the bearings later. The rollers, cones and cups should be examined carefully for pitting or other signs of wear.

Where "Orphan" Car Parts May Be Obtained

List of Cars Now Out of Manufacture and Names of Dealers Who Supply Equipment

- ABBOTT.**
Auto Parts Co., 116-18 Olive St., St. Louis, Mo.
Auto Salvage Co., 1701-03 Main St., Kansas City, Mo.
Auto Salvage & Exchange Co., 1317-19 Locust St., Des Moines, Ia.
Bone Yard, The, Washington, Ia.
Puritan Machine Co., 422 Lafayette Boulevard, Detroit, Mich.
Standard Motor Parts Co., Detroit, Mich.
- ADAMS.**
Longaker Co., V. A., 448-50 N. Capitol Ave., Indianapolis, Ind.
- AEROCAR.**
Auto Gear & Parts Co., 291-93 Marietta St., Atlanta.
Auto Salvage & Exchange Co., 1317-19 Locust St., Des Moines.
- ALCO.**
Alco Service Co., 158-62 N. 22nd St., Philadelphia.
American Locomotive Co., Providence.
Auto Salvage Co., 1701-03 Main St., Kansas City.
International Motor Co., West End Ave. and 64th St., New York.
Levene Motor Co., 2200-18 Diamond St., Philadelphia.
Puritan Machine Co., 422 Lafayette Boulevard, Detroit.
- ALDEN-SAMPSON.**
Puritan Machine Co., 422 Lafayette Boulevard, Detroit.
Standard Motor Parts Co., New Castle, Ind.
- ALLIS-CHALMERS.**
Puritan Machine Co., 422 Lafayette Boulevard, Detroit.
- ALMA.**
Dayton Auto Parts Co., 1777 Broadway, New York.
- ALPENA.**
Auto Gear & Parts Co., 291-93 Marietta St., Atlanta.
Auto Salvage & Exchange Co., 1317-19 Locust St., Des Moines.
Puritan Machine Co., 422 Lafayette Boulevard, Detroit.
- ALTER.**
American Motors Parts Co., 430 N. Capitol Ave., Indianapolis.
Auto Gear & Parts Co., 291-93 Marietta St., Atlanta.
Puritan Machine Co., 422 Lafayette Boulevard, Detroit.
- AMERICAN.**
American Motors Parts Co., 430 N. Capitol Ave., Indianapolis.
Longaker Co., V., 448-50 N. Capitol Ave., Indianapolis.
Purt Motor Car Co., W. J., Pico and Hope Sts., Los Angeles.
- AMERICAN MORS.**
St. Louis Car Co., 8000 N. Broadway, St. Louis.
Wichita Auto Wrecking Co., 805-809 W. Douglas Ave., Wichita.
- AMERICAN UNDERSLUNG.**
American Motor Parts Co., 430 N. Capitol Ave., Indianapolis.
Auto Gear & Parts Co., 291-93 Marietta St., Atlanta.
Auto Salvage Co., 1701-03 Main St., Kansas City.
Longaker Co., V. A., 448 N. Capitol Ave., Indianapolis.
Puritan Machine Co., 422 Lafayette Boulevard, Detroit.
- AMES.**
Auto Gear & Parts Co., 291-93 Marietta St., Atlanta.
Auto Salvage & Exchange Co., 1317-19 Locust St., Des Moines.
- AMPLEX.**
Gillette Motors Co., Mishawaka.
Gorey & Co., Jos. C., 354 W. 50th St., N. Y.
- ANCHOR.**
Gustin Automobile Co., 18-20 E. Mitchell Ave., Cincinnati.
- ANHUT.**
Puritan Machine Co., 422 Lafayette Boulevard, Detroit.
- ARBENZ.**
Auto Gear & Parts Co., 291-93 Marietta St., Atlanta.
- ARGO.**
Puritan Machine Co., 422 Lafayette Boulevard, Detroit.
- ARGO ELECTRIC.**
Puritan Machine Co., 422 Lafayette Boulevard, Detroit.
- ATLANTIC.**
Auto Gear Co., 844 Eighth Ave., New York.
Puritan Machine Co., 422 Lafayette Boulevard, Detroit.
- ATLAS.**
Auto Gear & Parts Co., 291-93 Marietta St., Atlanta.
Auto Parts Co., 4116-18 Olive St., St. Louis.
Gorey & Co., Jos. C., 354 W. 50th St., N. Y.
Puritan Machine Co., 422 Lafayette Boulevard, Detroit.
- AUSTIN.**
Puritan Machine Co., 422 Lafayette Boulevard, Detroit.
- BABCOCK.**
Auto Gear & Parts Co., 291-93 Marietta St., Atlanta.
Dayton Auto Parts Co., 1777 Broadway, New York.
- BADGER.**
Auto Gear & Parts Co., 291-93 Marietta St., Atlanta.
Auto Salvage & Exchange Co., 1317-19 Locust St., Des Moines.
Puritan Machine Co., 422 Lafayette Boulevard, Detroit.
Schultz & Harder, Columbus, Wis.
- BARNES.**
Puritan Machine Co., 422 Lafayette Boulevard, Detroit.
- BAUER.**
Bauer Machine Co., 109 W. 18th St., Kansas City.
- BEAVER.**
Auto Parts Co., 4116 Olive St., St. Louis.
- BENHAM.**
Dayton Auto Parts Co., 1777 Broadway, New York.
Gorey & Co., Jos. C., 354 W. 50th St., N. Y.
Puritan Machine Co., 422 Lafayette Boulevard, Detroit.
- BENZ.**
Gorey & Co., Jos. C., 354 W. 50th St., N. Y.
- BERGDOLL.**
Auto Gear & Parts Co., 291-93 Marietta St., Atlanta.
Auto Parts Co., 4116 Olive St., St. Louis.
Gorey & Co., Jos. C., 354 W. 50th St., N. Y.
Levene Motor Co., 2200-18 Diamond St., Philadelphia.
Puritan Machine Co., 422 Lafayette Boulevard, Detroit.
Schober, G. M., 3339 Market St., Philadelphia.
- BERKSHIRE.**
Auto Gear & Parts Co., 291-93 Marietta St., Atlanta.
Belcher Engineering Co., 43 Ames St., Cambridge, Mass.
Dayton Auto Parts Co., 1777 Broadway, New York.
Puritan Machine Co., 422 Lafayette Boulevard, Detroit.
- BERLIET.**
American Locomotive Co., Providence, R. I.
- BESSEMER.**
Puritan Machine Co., 422 Lafayette Boulevard, Detroit.
- BIMEL.**
American Motor Parts Co., 430 N. Capitol Ave., Indianapolis.
- BLACK CROW.**
Crow-Elkhart Motor Co., 1100 N. Main St., Elkhart, Ind.
- BLOMSTROM.**
Puritan Machine Co., 422 Lafayette Boulevard, Detroit.
- BORLAND.**
Puritan Machine Co., 422 Lafayette Boulevard, Detroit.
- BRIGGS-DETROITER.**
Levene Motor Co., 2200-18 Diamond St., Philadelphia.
Midland Motor Co., 2029 Michigan Ave., Chicago.
Puritan Machine Co., 422 Lafayette Boulevard, Detroit.
- BROC ELECTRIC.**
Puritan Machine Co., 422 Lafayette Boulevard, Detroit.
- BRODESSER.**
Puritan Machine Co., 422 Lafayette Boulevard, Detroit.
- BROWN.**
Bone Yard, The, Washington, Iowa.
Great Western Automobile Co., Kalamazoo.
- BRUSH.**
Auto Parts Co., 4116-18 Olive St., St. Louis.
Auto Salvage & Exchange, 1317-19 Locust St., Des Moines.
Auto Salvage Co., 1701-03 Main St., Kansas City.
Davidson Repair Shop, 227 W. 64th St., New York.
Puritan Machine Co., 422 Lafayette Boulevard, Detroit.
Standard Motor Parts Co., New Castle, Ind.
- BURG.**
Wichita Auto Wrecking Co., 807 W. Douglas Ave., Wichita.
- BUSH.**
Victor Motor Co., York, Pa.
- CALIFORNIA.**
Puritan Machine Co., 422 Lafayette Boulevard, Detroit.
- CARHARTT.**
Auto Gear & Parts Co., 291-293 Marietta St., Atlanta.
Dayton Auto Parts Co., 1777 Broadway, New York.
Gorey & Co., Jos. C., 354 W. 50th St., N. Y.
Puritan Machine Co., 422 Lafayette Boulevard, Detroit.
- CAR-NATION.**
Auto Gear & Parts Co., 291-93 Marietta St., Atlanta.
Car-Nation Motor Co., Detroit.
Puritan Machine Co., 422 Lafayette Boulevard, Detroit.
Standard Motor Parts Co., Detroit.
- CARTERCAR.**
Puritan Machine Co., 422 Lafayette Boulevard, Detroit.
Wichita Auto Wrecking Co., 807 W. Douglas Ave., Wichita.
- CARTHAGE.**
Puritan Machine Co., 422 Lafayette Boulevard, Detroit.
- CAVAC.**
Puritan Machine Co., 422 Lafayette Boulevard, Detroit.
- CENTURY.**
Puritan Machine Co., 422 Lafayette Boulevard, Detroit.
- CHADWICK.**
Auto Salvage Co., 1701-03 Main St., Kansas City.
Berkholz, Louis, 223 N. Fourth St., Philadelphia.
- CHASE.**
Auto Parts Co., 4116-18 Olive St., St. Louis.
- CINCO.**
Auto Salvage Co., 1701-03 Main St., Kansas City.
Puritan Machine Co., 422 Lafayette Boulevard, Detroit.
Queen City Auto Parts Co., 633 Main St., Cincinnati.
- CINO.**
Northway Auto Parts & Sales Co., 223 Kearney St., Cincinnati.
- CLARK.**
Puritan Machine Co., 422 Lafayette Boulevard, Detroit.
Wichita Auto Wrecking Co., 807 W. Douglas Ave., Wichita.

CLARK-CARTER.

Erbes, L. C., 2654 W. University Ave., St. Paul.
Puritan Machine Co., 422 Lafayette Boulevard, Detroit.

COATES-GOSHEN.

Coates, J. S., Goshen, N. Y.

COLBURN.

Colburn Automobile Co., 416 E. 10th Avenue, Denver.
Puritan Machine Co., 422 Lafayette Boulevard, Detroit.

COLBY.

Auto Gear Co., 1404 Hennepin Ave., Minneapolis.
Harper, E. V., 306 S. Federal St., Mason City, Iowa.
Puritan Machine Co., 422 Lafayette Boulevard, Detroit.

COLUMBIA (Old).

Columbia Auto Repair Co., 19 Buckingham St., Hartford.
Standard Motor Parts Co., Detroit.
Standard Motor Parts Co., New Castle, Ind.

COLUMBIA KNIGHT.

Columbia Auto Repair Co., Hartford.
Standard Motor Parts Co., New Castle, Ind.

COLUMBUS ELECTRIC.

Butler Mfg. Co., Knightstown, Ind.
Columbus Buggy Parts Co., Dublin Ave., Columbus.

CONTINENTAL.

Auto Parts Co., 4116 Olive St., St. Louis.
Continental Auto Parts Co., Knightstown, Ind.
Puritan Machine Co., 422 Lafayette Boulevard, Detroit.

CORBIN.

Puritan Machine Co., 422 Lafayette Boulevard, Detroit.

COURIER.

Auto Gear & Parts Co., 291-93 Marietta St., Atlanta.
Dayton Auto Parts Co., 1777 Broadway, New York.
Gorey & Co., Jos. C., 354 W. 50th St., New York.
Puritan Machine Co., 422 Lafayette Boulevard, Detroit.

COURIER-CLERMONT.

Puritan Machine Co., 422 Lafayette Boulevard, Detroit.
Standard Motor Parts Co., New Castle, Ind.

CRESCENT.

Auto Gear & Parts Co., 291-93 Marietta St., Atlanta.
Puritan Machine Co., 422 Lafayette Boulevard, Detroit.
St. Bernard Garage, St. Bernard, Ohio.

CROW.

Auto Gear & Parts Co., 291-93 Marietta St., Atlanta.
Crow-Elkhart Motor Co., 1116 N. Main St., Elkhart, Ind.

CROXTON.

Puritan Machine Co., 422 Lafayette Boulevard, Detroit.

CROXTON-KEETON.

Auto Salvage & Exchange Co., 1317 Locust St., Des Moines.
Dayton Auto Parts Co., 1777 Broadway, New York.
Puritan Machine Co., 422 Lafayette Boulevard, Detroit.

CUTTING.

Auto Salvage & Exchange Co., 1317 Locust St., Des Moines.
Bone Yard, The, Washington, Iowa.
Erbes, L. C., 2654 W. University Ave., St. Paul, Minn.
Gorey & Co., Jos. C., 354 W. 50th St., New York.
Puritan Machine Co., 422 Lafayette Boulevard, Detroit.

DAVIS.

Dayton Auto Parts Co., 351-55 W. 52nd St., New York.

DEARBORN-DETROIT.

Huron Motor Car Co., Dearborn, Mich.
Puritan Machine Co., 422 Lafayette Boulevard, Detroit.

DECAUVILLE.

Gorey & Co., Jos. C., 354 W. 50th St., New York.

DE KALB.

Dayton Auto Parts Co., 1777 Broadway, New York.

DE LUXE.

Puritan Machine Co., 422 Lafayette Boulevard, Detroit.

DE TAMBLE.

American Motors Parts Co., 430 N. Capitol Ave., Indianapolis.
Puritan Machine Co., 422 Lafayette Boulevard, Detroit.
Shepard Auto Co., 106 Pennsylvania Ave., Brooklyn.

DETROITER.

Bone Yard, The, Washington, Iowa.
Detrioter Motor Car Co., Detroit, Mich.

DOLSON.

Dayton Auto Parts Co., 1777 Broadway, New York.

DRAGON.

Gorey & Co., Jos. C., 354 W. 50th St., New York.
Philadelphia Machine Works, 61-71 Laurel St., Philadelphia.
Puritan Machine Co., 422 Lafayette Boulevard, Detroit.

DREXEL.

Auto Gear & Parts Co., 291-93 Marietta St., Atlanta.

DRUMMOND.

Auto Gear & Parts Co., 291-93 Marietta St., Atlanta.

DUPONT.

Victor Motor Co., York, Pa.

DUROCAR.

Auto Gear Co., 1044 Hennepin Ave., Minneapolis.
Auto Parts Co., 4116-18 Olive St., St. Louis, Mo.

EDWARD-KNIGHT.

Dayton Auto Parts Co., 1777 Broadway, New York.
Willis-Overland, Inc., Toledo.

ELMORE.

Auto Gear & Parts Co., 291-93 Marietta St., Atlanta.
Auto Parts Co., 4116-18 Olive St., St. Louis, Mo.
Auto Salvage Co., 1701-03 Main St., Kansas City.
Gorey & Co., Jos. C., 354 W. 50th St., New York.
Puritan Machine Co., 422 Lafayette Boulevard, Detroit.

E. M. F.

Bone Yard, The, Washington, Iowa.
Gorey & Co., Jos. C., 354 W. 50th St., New York.
Studebaker Corp. of America, Piquette Ave. and Brush St., Detroit.

E-M-F THIRTY.

Carey & Davis, 486 Louisiana Ave., Washington, D. C.
Puritan Machine Co., 422 Lafayette Boulevard, Detroit.

ENGEL.

American Motors Parts Co., 430 N. Capitol Ave., Indianapolis.
Erbes, L. E., Motor Car Co., 2654 W. University Ave., St. Paul.
Wichita Auto Wrecking Co., 807 W. Douglas Ave., Wichita.

EVERETT.

Auto Gear Co., 1404 Hennepin Ave., Minneapolis.
Auto Parts Co., 4116-18 Olive St., St. Louis, Mo.
Dayton Auto Parts Co., 1777 Broadway, New York.

Gorey & Co., Jos. C., 354 W. 50th St., New York.

Puritan Machine Co., 422 Lafayette Boulevard, Detroit.
Standard Motor Parts Co., New Castle, Ind.

EWING.

Gorey & Co., Jos. C., 354 W. 50th St., New York.
Puritan Machine Co., 422 Lafayette Boulevard, Detroit.

F. A. L.

Auto Salvage Co., 1701-03 Main St., Kansas City.
Auto Salvage & Exchange Co., 1317 Locust St., Des Moines.
Puritan Machine Co., 422 Lafayette Boulevard, Detroit.

FALCAR.

Wichita Auto Wrecking Co., 807 W. Douglas Ave., Wichita.

FARMACK.

Auto Gear & Parts Co., 291-93 Marietta St., Atlanta.

FLANDERS.

Auto Parts Co., 4116-18 Olive St., St. Louis, Mo.
Bone Yard, The, Washington, Iowa.
Dayton Auto Parts Co., 1777 Broadway, New York.
Levine Motor Co., 220 Diamond St., Philadelphia.
Puritan Machine Co., 422 Lafayette Boulevard, Detroit.
Standard Motor Parts Co., New Castle, Ind.
Studebaker Corp. of America, Piquette Ave. and Brush St., Detroit.

FIRESTONE COLUMBUS.

Columbus Buggy Parts Co., Dublin Ave., Columbus.

FLANDERS ELECTRIC.

Levene Motor Co., 2200-18 Diamond St., Philadelphia.

FULLER.

Jackson Automobile Co., 1203 E. Main St., Jackson, Mich.
Wichita Auto Wrecking Co., 807 W. Douglas Ave., Wichita.

GAETH.

Gaeth Motor Car Co., 2103 Lorain Ave., Cleveland.

GARFORD.

Auto Parts Co., 4116-18 Olive St., St. Louis, Mo.
Elyria Belting & Machinery Co., Elyria, O.
Puritan Machine Co., 422 Lafayette Boulevard, Detroit.

G-J-G.

Grossman Auto Parts Co., White Plains, N. Y.

GLEASON.

Auto Salvage Co., 1701-03 Main St., Kansas City.
Bauer Machine Works Co., 109 W. 18th St., Kansas City.

GRABOWSKY.

Dayton Auto Parts Co., 1777 Broadway, New York.
Gorey & Co., Jos. C., 354 W. 50th St., New York.
Puritan Machine Co., 422 Lafayette Boulevard, Detroit.

GRAMM.

Auto Salvage Co., 1701-03 Main St., Kansas City.
Puritan Machine Co., 422 Lafayette Boulevard, Detroit.

GRAMM-LOGAN.

Garford Motor Truck Co., Wapaka Road, Lima, O.

GREAT EAGLE.

Auto Salvage Co., 1701-03 Main St., Kansas City.

GREAT SMITH.

Auto Salvage Co., 1701-03 Main St., Kansas City.

GREAT WESTERN.

Auto Salvage & Exchange Co., 1317-19 Locust St., Des Moines.
Great Western Automobile Co., Kalamazoo, Mich.
Puritan Machine Co., 422 Lafayette Boulevard, Detroit.

GROUT.

Red Arrow Auto Co., E. River St., Orange, Mass.

HATFIELD.

Auto Gear & Parts Co., 291-93 Marietta St., Atlanta.

HAVERS.

Auto Salvage & Exchange Co., 1317-19 Locust St., Des Moines.
Dayton Auto Parts Co., 1777 Broadway, New York.
Gorey & Co., Jos. C., 354 W. 50th St., New York.
Puritan Machine Co., 422 Lafayette Boulevard, Detroit.

HAZARD.

Puritan Machine Co., 422 Lafayette Boulevard, Detroit.

HENDERSON.

Auto Salvage Co., 1701-03 Main St., Kansas City.
Buda Co., Harvey, Ill.
Gorey & Co., Jos. C., 354 W. 50th St., New York.
Henderson Motor Car Co., Detroit.
Puritan Machine Co., 422 Lafayette Boulevard, Detroit.
Smith Corp., A. O., Milwaukee.

HENRY.

Gorey & Co., Jos. C., 354 W. 50 St., New York.
Puritan Machine Co., 422 Lafayette Boulevard, Detroit.

HERFF-BROOKS.

Auto Salvage Co., 1701-03 Main St., Kansas City.

HERESHOFF.

American Motors Parts Co., 430 N. Capitol Ave., Indianapolis.
Auto Parts Co., 4116-18 Olive St., St. Louis.
Gorey & Co., Jos. C., 354 W. 50th St., New York.
Puritan Machine Co., 422 Lafayette Boulevard, Detroit.

HEWITT.

International Motor Co., 64th St. & West End Ave., New York.

HOUPP ROCKWELL.

New Departure Mfg. Co., Bristol, Conn.

HUDSON FRANKLIN.

Boston Auto Parts Co., 1221 Dorchester Ave., Boston.

IMPERIAL.

Auto Gear Co., 1404 Hennepin Ave., Minneapolis.
Auto Gear & Parts Co., 291-93 Marietta St., Atlanta.
Erbes, L. C., 2654 W. University Ave., St. Paul, Minn.
Imperial Auto Parts Co., Detroit.
Mutual Motors Co., N. Townawanda, N. Y.
Puritan Machine Co., 422 Lafayette Boulevard, Detroit.
Standard Motor Parts Co., Detroit.

INDIANA.

Dayton Auto Parts Co., 1777 Broadway, New York.

JACKSON.

Auto Salvage Co., 1701-03 Main St., Kansas City.
Jackson Automobile Co., Jackson, Mich.

JEFFERY.

Auto Parts Co., 4116-18 Olive St., St. Louis.
Nash Motors Co., Kenosha, Wis.

JENKINS.

Dayton Auto Parts Co., 1777 Broadway, New York.

KEETON.

Car-Nation Motor Car Co., Detroit.
Puritan Machine Co., 422 Lafayette Boulevard, Detroit.
Standard Motor Parts Co., Detroit.

KERMATH.

Puritan Machine Co., 422 Lafayette Boulevard, Detroit.

KERMET.

Keith Bros., Elkhart, Ind.
Knox Motor Co., 53 Wilbraham Rd., Springfield, Mass.
Puritan Machine Co., 422 Lafayette Boulevard, Detroit.

KNOX.

Alco Service Co., 158-62 N. 22nd St., Philadelphia.
Boulevard Motor Co., 276 River St., Cambridge, Mass.

KREBS.

Dayton Auto Parts Co., 1777 Broadway, New York.

KRIT.

Auto Parts Co., 4116-18 Olive St., St. Louis.
Auto Salvage Co., 1701-03 Main St., Kansas City.
Connecticut Auto Parts Co., 583 Franklin Ave., Hartford, Conn.
Krit Motor Car Co., Detroit, Mich.
Motor Corporation, rear 1309 Race St., Philadelphia.
Puritan Machine Co., 412 Lafayette Boulevard, Detroit.
Schober, G. M., 3339 Market St., Philadelphia.
Standard Motor Parts Co., Detroit.

LAMBERT.

Lambert Auto Service Co., 430 N. Capital Ave., Indianapolis, Ind.
Wichita Auto Wrecking Co., 807 W. Douglas Ave., Wichita.

LANDSEN-ELECTRIC.

Kelland Motor Car Co., 58 Elm St., Newark, N. J.

LENOX.

Puritan Machine Co., 422 Lafayette Boulevard, Detroit.

LEWIS.

Longaker Co., V. A., 448 N. Capitol Ave., Indianapolis.
Puritan Machine Co., 422 Lafayette Boulevard, Detroit.

LION.

Gorey & Co., Jos. C., 354 W. 50th St., New York.
Levene Motor Co., 2200-18 Diamond St., Philadelphia.
Lion Motor Parts Co., Philadelphia.
Midland Motor Co., 2029 Michigan Ave., Chicago.
Puritan Machine Co., 422 Lafayette Boulevard, Detroit.

LITTLE.

Auto Gear Co., 1404 Hennepin Ave., Minneapolis.
Chevrolet Motor Co., 1764 Broadway, New York.
Puritan Machine Co., 422 Lafayette Boulevard, Detroit.

LOGAN.

Gramm Motor Truck Co., Lima, O.

LONGEST.

Longest Bros. Co., 725-29 S 3rd St., Louisville, Ky.

LOZIER.

Gorey & Co., Jos. C., 354 W. 50th St., New York.
Lozier Motor Car Co., Fort and Sixth Sts., Detroit, Mich.
Puritan Machine Co., 422 Lafayette Boulevard, Detroit.

MCINTYRE.

Puritan Machine Co., 422 Lafayette Boulevard, Detroit.

MARATHON.

Marathon Service Co., 14th & Clinton Sts., Nashville, Tenn.
Puritan Machine Co., 422 Lafayette Boulevard, Detroit.
Wichita Auto Wrecking Co., 807 W. Douglas Ave., Wichita.

MARION.

American Motors Parts Co., 430 N. Capitol Ave., Indianapolis.
Automobile Mechanics Corp., 159-61 W. 24th St., New York.
Auto Parts Co., 4116-18 Olive St., St. Louis.
Connecticut Auto Parts Co., 583 Franklin Ave., Hartford, Conn.
Dayton Auto Parts Co., 1777 Broadway, New York.
Elyria Belting & Machinery Co., Elyria, O.
Gorey & Co., Jos. C., 354 W. 50th St., New York.
Longaker Co., V. A., 448-50 N. Capitol Ave., Indianapolis.
Marion Motor Co., 2450 Michigan Ave., Chicago.
Mutual Motors Co., N. Townawanda, N. Y.
Puritan Machine Co., 422 Lafayette Boulevard, Detroit.

MARION-HANDLEY.

Dayton Auto Parts Co., 1777 Broadway, New York.

MARQUETTE.

Auto Salvage Co., 1701-03 Main St., Kansas City.
Puritan Machine Co., 422 Lafayette Boulevard, Detroit.

MASON.

Auto Salvage & Exchange Co., 1317-19 Locust St., Des Moines.
Erbes, L. C., 2654 W. University Ave., St. Paul, Minn.
Longaker Co., V. A., 448-50 N. Capitol Ave., Indianapolis.
Mason Motor Car Co., Detroit, Mich.
Puritan Machine Co., 422 Lafayette Boulevard, Detroit.
Standard Motor Parts Co., Detroit.

MATHESON.

Boulevard Motor Co., 276 River St., Cambridge, Mass.
Matheson Co., Frank F., 694 Wyoming Ave., Wilkes-Barre, Pa.
Puritan Machine Co., 422 Lafayette Boulevard, Detroit.

MAYTAG.

Metz Wichita Auto Wrecking Co., 1807 W. Douglas Ave., Wichita.
Puritan Machine Co., 422 Lafayette Boulevard, Detroit.

MERCEDES.

Connecticut Auto Parts Co., 583 Franklin Ave., Hartford, Conn.

MICHIGAN.

Buda Co., Harvey, Ill.
Burt Motor Car Co., W. J. Pico & Hope Sts., Los Angeles.
Dauch Mfg. Co., 303 W. Water St., Sandusky, O.

Davis, Carey A., 486 Louisiana Ave., Washington, D. C.
Gorey & Co., Jos. C., 354 W. 50th St., New York.
Michigan Motor Car Parts Co., Detroit.
Philadelphia Machine Works, 61-71 Laurel St., Philadelphia.
Puritan Machine Co., 422 Lafayette Boulevard, Detroit.

MIDLAND.

Auto Gear & Parts Co., 291-93 Marietta St., Atlanta.
Levene Motor Co., 2200-18 Diamond St., Philadelphia.
Puritan Machine Co., 422 Lafayette Boulevard, Detroit.

MILLER.

Puritan Machine Co., 422 Lafayette Boulevard, Detroit.

MILWAUKEE.

Erbes, L. C., 2654 W. University Ave., St. Paul, Minn.
Smith, A. O., Corp., Milwaukee.

MOGUL.

Auto Salvage Co., 1701-03 Main St., Kansas City.

MOLINE.

Auto Parts Co., 4116-18 Olive St., St. Louis.

MONARCH.

Puritan Machine Co., 422 Lafayette Boulevard, Detroit.
Wichita Auto Wrecking Co., 807 W. Douglas Ave., Wichita.

MORA.

Philadelphia Machine Works, 61-71 Laurel St., Philadelphia.
Puritan Machine Co., 422 Lafayette Boulevard, Detroit.

MORGAN.

Steele, W. M., 98-100 Beacon St., Worcester, Mass.

MOYER.

Auto Salvage & Exchange Co., 1317-19 Locust St., Des Moines.

NANCE.

Gorey & Co., Jos. C., 354 W. 50th St., New York.

NIAGARA.

Auto Gear & Parts Co., 291-93 Marietta St., Atlanta.

NORTHERN.

Puritan Machine Co., 422 Lafayette Boulevard, Detroit.

NORTHWESTERN.

Puritan Machine Co., 422 Lafayette Boulevard, Detroit.

NYBERG.

American Motors Parts Co., 430 N. Capitol Ave., Indianapolis.
Auto Salvage & Exchange Co., 1317-19 W. Locust St., Des Moines.
Longaker Co., V. A., 448-50 N. Capitol Ave., Indianapolis.
Puritan Machine Co., 422 Lafayette Boulevard, Detroit.

OHIO.

Northway Auto Parts & Sales Co., 233 Kearney St., Cincinnati.
Puritan Machine Co., 422 Lafayette Boulevard, Detroit.
Smith Corp., A. O., Milwaukee.

OMAHA.

Dayton Auto Parts Co., 1777 Broadway, New York.
Puritan Machine Co., 422 Lafayette Boulevard, Detroit.

OWEN.

Puritan Machine Co., 422 Lafayette Boulevard, Detroit.

PALMER-MOORE.

Dayton Auto Parts Co., 1777 Broadway, New York.

PALMER-SINGER.

Auto Parts Co., 4116-18 Olive St., St. Louis.
Auto Salvage & Exchange Co., 1317-19 Locust St., Des Moines.
Puritan Machine Co., 422 Lafayette Boulevard, Detroit.
Singer Motor Co., 102-04 West End Ave., New York.

PARRY.

Auto Parts Co., 4116-18 Olive St., St. Louis.
Puritan Machine Co., 422 Lafayette Boulevard, Detroit.

PARTIN.

Auto Parts Co., 4116-18 Olive St., St. Louis.
PATHFINDER.
American Motors Parts Co., 430 N. Capitol Ave., Indianapolis.

Dayton Auto Parts Co., 1777 Broadway, New York.
 Pathfinder Co., The., Indianapolis, Ind.
 Pathfinder Motor Co. of America, 1136 Division St., Philadelphia.

PENN.

Buda Co., Harvey, Ill.

PENNSYLVANIA.

Central Auto Supply Co., Philadelphia.
 Dougherty, 1545 N. 19th St., Philadelphia.
 Gorey & Co., Jos. C., 354 W. 50th St., New York.
 Puritan Machine Co., 422 Lafayette Boulevard, Detroit.
 Stehle, Remy W., 1523-25 Brandywine St., Philadelphia.

PENN-THIRTY.

Puritan Machine Co., 422 Lafayette Boulevard, Detroit.

PERU.

Puritan Machine Co., 422 Lafayette Boulevard, Detroit.

PETREL.

Filer & Stowell, Milwaukee.

POPE-HARTFORD.

Auto Salvage Co., 1701-03 Main St., Kansas City.
 Boulevard Motor Co., Cambridge, Mass.
 Hartford Motor Car Co., 410 Main St., Hartford, Conn.
 Puritan Machine Co., 422 Lafayette Boulevard, Detroit.
 Rosenfield, J., 521 Sixth St. (S. Boston), Boston.
 Walker & Barkman Mfg. Co., Hartford.

POPE-TOLEDO.

Auto Salvage Parts Co., 1436 Wabash Ave., Chicago.
 Connecticut Auto Parts Co., 583 Franklin Ave., Hartford, Conn.

POPE-TRIBUNE.

Auto Salvage & Exchange Co., 1317-19 Locust St., Des Moines.
 Hartford Motor Car Co., 410 Main St., Hartford, Conn.
 Walker & Barkman Mfg. Co., Hartford, Conn.

POSS.

Auto Parts Co., 1777 Broadway, New York.

PULLMAN.

Auto Gear Co., 1404 Hennepin Ave., Minneapolis.
 Gorey & Co., Jos. C., 354 W. 54th St., New York.
 Levene Motor Co., 2200-18 Diamond St., Philadelphia.
 Pullman Motor Car Co., York, Pa.
 Puritan Machine Co., 422 Lafayette Boulevard, Detroit.

QUEEN.

Auto Parts Co., 1416-18 Olive St., St. Louis.
 Auto Salvage & Exchange Co., 1317-19 Locust St., Des Moines.
 Gorey & Co., Jos. C., 354 W. 50th St., New York.
 Johns Auto Machine Works, W. H., 908 W. Pico St., Los Angeles.
 Philadelphia Machine Works, 69-71 Laurel St., Philadelphia.
 Puritan Machine Co., 422 Lafayette Boulevard, Detroit.

RAINIER.

Garford Motor Truck Co., Wapaka Road, Lima, O.
 Gramm Motor Truck Co., Lima, O.
 Puritan Machine Co., 422 Lafayette Boulevard, Detroit.

RAMBLER.

Auto Salvage & Exchange Co., 1317-19 Locust St., Des Moines.
 Nash Motors Co., Kenosha, Wis.
 Wichita Auto Wrecking Co., 807 W. Douglas Ave., Wichita.

RANDOLPH.

DeKalb Wagon Co., DeKalb, Ill.
 Puritan Machine Co., 422 Lafayette Boulevard, Detroit.

RAYFIELD.

Auto Parts Co., 4116-18 Olive St., St. Louis.

READ.

American Motors Parts Co., 430 N. Capitol Ave., Indianapolis.

REGAL.

Auto Salvage & Exchange Co., 1317-19 Locust St., Des Moines.
 Bone Yard, The, Washington, Iowa.
 Levene Motor Co., 2200-18 Diamond St., Philadelphia.

RELIABLE-DAYTON.

Puritan Machine Co., 422 Lafayette Boulevard, Detroit.

REPUBLIC.

Republic Motor Car Co., Youngstown, O.

RIDER-LEWIS.

American Motors Parts Co., 430 N. Capitol Ave., Indianapolis.
 Auto Parts Mfg. Co., Detroit.
 Longaker Co., V. A., 448-50 N. Capitol Ave., Indianapolis.
 Wichita Auto Wrecking Co., 807 W. Douglas Ave., Wichita.

ROSS.

Dayton Auto Parts Co., 1777 Broadway, New York.
 Puritan Machine Co., 422 Lafayette Boulevard, Detroit.
 Standard Motor Parts Co., Detroit, Mich.

ROYAL TOURIST.

Auto Parts Co., 4116-18 Olive St., St. Louis.

RUSH.

Diehl Motor Truck Works, 30th & Montgomery Aves., Philadelphia.
 Levene Motor Co., 2200-18 Diamond St., Philadelphia.

SAMPSON.

Standard Motor Parts Co., New Castle, Ind.

SCHACHT.

Buda Co., Harvey, Ill.
 Puritan Machine Co., 422 Lafayette Boulevard, Detroit.

SCRIPPS-BOOTH CYCLE CAR.

Gorey & Co., Jos. C., 354 W. 50th St., New York.
 Puritan Machine Co., 422 Lafayette Boulevard, Detroit.

SELDEN.

Auto Gear & Parts Co., 291-93 Marietta St., Atlanta.

Puritan Machine Co., 422 Lafayette Boulevard, Detroit.

Shepard Auto Co., 106 Pennsylvania Ave., Brooklyn, N. Y.

SOUTHERN.

Puritan Machine Co., 422 Lafayette Boulevard, Detroit.

SPEEDWELL.

Auto Gear & Parts Co., 291-93 Marietta St., Atlanta.

Green Engineering Co., 4th and St. Clair Sts., Dayton, O.

Kany, A. S., 251 Boyer St., Dayton, O.

Northway Auto Parts & Sales Co., 223 Kearney St., Cincinnati.

Puritan Machine Co., 422 Lafayette Boulevard, Detroit.

SPHINX.

Dayton Auto Parts Co., 1777 Broadway, New York.

SPRINGFIELD.

Haas Electric & Mfg. Co., 306-07 E. Monroe St., Springfield, Ill.

STAFFORD.

Auto Salvage Co., 1701-03 Main St., Kansas City.

STANDARD.

St. Louis Car Co., 5200 N. Second St., St. Louis.

STANDARD SIX.

St. Louis Car Co., 8000 N. Broadway, St. Louis.

STAR.

Mier Carriage & Buggy Co., Ligonier, Ind.

STAYER.

Dayton Auto Parts Co., 1777 Broadway, New York.

STERLING.

Puritan Machine Co., 422 Lafayette Boulevard, Detroit.

STEVENS-DURYEA.

Boulevard Motor Co., 276 River St., Cambridge, Mass.

Colwell, F. C., 807-9 Race St., Philadelphia.

Frank Co., Paul, 2349 Michigan Ave., Chicago.

Walk Hill Garage, 726 Walk Hill St., Mat-tapan, Mass.

STODDARD-DAYTON.

Boulevard Motor Co., 276 River St., Cambridge, Mass.

Dayton Auto Parts Co., 1777 Broadway, New York.

Standard Motor Parts Co., New Castle, Ind.

Warshawsky & Co., 1915 S. State St., Chicago, Ill.

SUBURBAN.

Dayton Auto Parts Co., 1777 Broadway, New York.

Puritan Machine Co., 422 Lafayette Boulevard, Detroit.

SULTAN.

Auto Gear & Parts Co., 291-93 Marietta St., Atlanta.

Puritan Machine Co., 422 Lafayette Boulevard, Detroit.

THOMAS.

Gorey & Co., Jos. C., 354 W. 50th St., New York.

Jahns, W. H., 908-12 W. Pico St., Los Angeles.

Rosenfield, J., 521 Sixth St. (So. Boston), Boston.

THOMAS-DETROIT.

Jahns Auto Machine Works, W. H., 908-12 W. Pico St., Los Angeles.

TOLEDO.

Dayton Auto Parts Co., 1777 Broadway, New York.

TOURAINÉ.

Gorey & Co., Jos. C., 354 W. 50th St., New York.

TOURIST.

Burt Motor Car Co., W. J., Pico & Hope Sts., Los Angeles.

TRAVELER.

Single Center Buggy Co., Fifth & Locust Sts., Evansville, Ind.

TRUMBULL.

Levene Motor Co., 2200-18 Diamond St., Philadelphia.

Puritan Machine Co., 422 Lafayette Boulevard, Detroit.

VICTOR.

Auto Gear & Parts Co., 291-93 Marietta St., Atlanta.

VIRGINIAN.

Auto Salvage & Exchange Co., 1317-19 Locust St., Des Moines.

VULCAN.

Savage Arms Corp., Sharon, Pa.

WAGENHALL.

Puritan Machine Co., 422 Lafayette Boulevard, Detroit.

WAHL.

Puritan Machine Co., 422 Lafayette Boulevard, Detroit.

WARREN.

Davis, Carey A., 486 Louisiana Ave., Washington, D. C.

Dayton Auto Parts Co., 1777 Broadway, New York.

Gorey & Co., Jos. C., 354 W. 50th St., New York.

Puritan Machine Co., 422 Lafayette Boulevard, Detroit.

WASHINGTON.

Davis, Carey A., 486 Louisiana Ave., Washington, D. C.

WAVERLY ELECTRIC.

Longaker Co., V. A., 448-50 N. Capitol Ave., Indianapolis.

WAYNE.

Auto Salvage Co., 1701-03 Main St., Kansas City.

Puritan Machine Co., 422 Lafayette Boulevard, Detroit.

WELCH-DETROIT.

Auto Salvage & Exchange, 1317-19 Locust St., Des Moines.

Puritan Machine Co., 422 Lafayette Boulevard, Detroit.

WELCH-PONTIAC.

Puritan Machine Co., 422 Lafayette Boulevard, Detroit.

WHITING.

Auto Gear & Parts Co., 291-93 Marietta St., Atlanta, Ga.

Chevrolet Motor Co., 1764 Broadway, New York.

Chevrolet Motor Co. of N. Y., Tarrytown, N. Y.

Puritan Machine Co., 422 Lafayette Boulevard, Detroit.

WOODWORTH.

Puritan Machine Co., 422 Lafayette Boulevard, Detroit, Mich.

YALE.

Brown-Lipe Gear Co., Syracuse, N. Y.

YALE EIGHT.

Puritan Machine Co., 422 Lafayette Boulevard, Detroit.

ZIMMERMAN.

Auto Gear Co., 844 Eighth Ave., New York, N. Y.

Auto Gear & Parts Co., 291-93 Marietta St., Atlanta.

Auto Salvage & Exchange, 1317-19 Locust St., Des Moines.

Council Bluffs Auto Parts Co., Council Bluffs, Ia.

ZIP.

Bauer Machine Works, Kansas City, Mo.

Wolf Auto Parts & Tire Co., 619 N. Illinois St., Indianapolis, Ind.

Notes of the Industry and Trade

Simms Co. to Build Light Four Car

One of the most important recent announcements in the automobile field in the southern section of the country is the entry of the Simms Motor Car Corporation into the motor car manufacturing industry at Atlanta, Ga. This concern contemplates the manufacturing and marketing of a light four-cylinder car, with valve-in-head engine, to be known as the Simms Light Four and to sell for \$1200.

The personnel of the Simms Motor Car Co. is as follows: President, Thomas H. Mars, formerly general manager of manufacturing for the Edward Valve & Manufacturing Co., East Chicago; vice president and general manager of sales, Jackson H. Simms, formerly with the Ameri-

La., and Atlanta. Harry L. Innes will be the production manager; R. A. Kettley, comptroller; J. M. Wilson, general manager of parts and service department, and C. D. Center, traffic manager.

PRODUCTION OF SHERIDAN CAR TO START IN AUGUST.

Announcement is made that the Sheridan Motor Car Co., a newly formed division of the General Motors Corporation, will manufacture the Sheridan passenger car at Muncie, Ind. The plant at that place, formerly used by the Inter-State Automobile Co., has been purchased and greatly improved, providing a possible output of 300 cars daily.

The new Sheridan car will be made in two sizes, four and eight-cylinder, each in roadster, touring, coupe and sedan models.

D. A. Burke, formerly in charge of the Buick Motor Co.'s business in Chicago,

Truck Manufacturers at Timken-Detroit Conference

It was the unanimous opinion of 52 truck manufacturers who were recent guests of the Timken-Detroit Axle Co. at Detroit that the present method of giving trucks a definite rating, or a chassis rating, is best, and that any change would be a source of endless trouble for the truck builder and the parts maker. It was agreed that the attempt to convert passenger cars into trucks has been a failure. That there is a market for speed trucks of 1500 pounds capacity was the view of nearly all the manufacturers.

While the various problems of motor truck manufacturing and marketing were discussed at the informal session, the question uppermost in the minds of many



Group of 52 Representatives of Truck Manufacturers Assembled at the Plant of the Timken-Detroit Axle Co., Detroit, to Consider Load Rating and Material Supplies.

can Locomotive Co. and later manager of the southeastern district for the Chevrolet car; vice president and chief engineer, E. W. Van Duzen, formerly connected with the Pullman Motor, Columbia Motor Car, Mitchell-Lewis, Reo Motor and Hanson Motor companies; secretary and general counsel, Erie M. Donaldson, formerly United States attorney for the southern district of Georgia.

The board of directors is composed, in addition to Messrs. Mars, Simms, Van Duzen and Donaldson, of the following: J. A. Vail, general manager of the Northwestern Expanded Metal Co. and former chairman of the board of directors of the Maxwell Motor Car Corporation; W. L. Mathers, president of the Mathers Motor Co. of Atlanta and of the Georgia State Automobile Dealers' association; Marion Smith of the law firm of Little, Howell, Smith & Goldstein, who will also act as special counsel for the Simms company; Walter P. Andrews, prominent lawyer and capitalist of Atlanta.

The advertising manager is D. K. Roberts, who has been identified with newspaper and automobile trade journal work for many years, recently in New Orleans,

and previous to that in other official positions with the Buick organization, is president of the Sheridan Motor Car Co. He is also the designer of the new car, working in conjunction with the General Motor's engineers.

OIL AND WATER-PROOF LEATHER.

A treatment for leather that makes it oil tight and proof against the deteriorating action of mud and water has been developed by the Woodworth Manufacturing Corporation of Niagara Falls, N. Y., for use in the lubricating spring covers which they make for the leaf springs of automobiles.

Leather treated by this process is especially adapted not only for spring covers, but for any other leather parts which are subjected to the action of mud, water, grease or oil. A number of the leading automobile manufacturers have adopted this leather for drag link boots, universal joint covers and other parts, having found in tests that it does not soak up the oil or grease and does not become brittle or rotten with age and the action of the elements.

of the guests repeatedly came to the surface. This was: "When can we get more axles?"

President A. R. Demory, General Manager Fred Glover and Sales Manager P. Due to the difficulty in securing quality materials, none was over optimistic. If contracts already signed are carried out, however, they promised an increase of from 12½ to 25 per cent in production this year and a 50 per cent increase in 1921.

DEATH OF MANAGER, TWITCHELL GAUGE CO.

Max D. Bendel, manager of the Twitchell Gauge Co., Chicago, died recently in that city from heart failure while on his way from his home to his place of business. Mr. Bendel succeeded to the management of the Twitchell Gauge Co. in 1912, shortly after that concern was acquired by A. Schrader's Sons, Inc., of Brooklyn, N. Y. In addition to his duties as sales executive of the Twitchell Gauge Co. he also conducted the Chicago branch of the Schrader Co.

Cloud Accessories Company Formed

The Morgan cord fan belt, Silver lining for Ford transmissions and Cloud "75" spark plug, are some of the specialties to be sold by the Cloud Accessories Corporation of Chicago, recently organized.

The new organization is composed of a group of successful automobile accessory men, headed by Kenneth Cloud of Chicago, who has been associated with the sale and manufacture of accessories for the last six years. He started in the accessory business in Long Beach, Cal., as a member of the Corey-Fitzgerald-Cloud Co., which put the "Myle Maker" and the "Forty-More" generator on the market. In connection with his work on these products he discovered "cork insert" transmission lining, and was instrumental in organizing the Advance Automobile Accessories Corporation, which took up the sale of this lining. Not only did Mr. Cloud handle sales, advertising and merchandising for the corporation, but he created the Advance house or-



Kenneth Cloud, Head of Cloud Accessories Corporation, Chicago.

the Silver lining for Ford transmissions great longevity.

New Tank Shop for Wayne Co.

The accompanying illustration shows the plant of the Wayne Oil Tank & Pump Co. at Fort Wayne, Ind. This company manufactures the well-known Wayne line of self-measuring pumps, liquid storage and oil filtration systems, oil-burning, metal-forging, heat-treating and metal-melting furnaces, etc.

At the extreme right of the illustration is seen the latest addition to this immense plant, the new heavy metal tank shop, which is incomplete as yet. This building will measure 360 feet by 130 feet, is to be made entirely of brick and steel, and will be equipped with the most up-to-date appliances for the manufacture of heavy metal storage tanks.

BLACK & DECKER BRANCH.

The Black & Decker Manufacturing Co., Towson Heights, Baltimore, Md., maker of portable electric tools, electric air compressors and special machinery, has opened a northeastern branch office



Plant of Wayne Oil Tank & Pump Co., Fort Wayne, Ind.—At Extreme Right Is New Tank Shop.

gan, "Let's Go," which is well known throughout the trade.

Later Mr. Cloud joined the Charles H. Touzalin advertising agency of Chicago as accessory merchandising man. When the war broke out he entered the motor transport division as a chauffeur, and was discharged after the armistice as a lieutenant. He returned to the Touzalin agency, confining his efforts to the Advance Automobile Accessories Co., Auto Components, Inc., and Motor Oils, Inc. He returned to the Advance company from this connection, from which position he resigned to organize the Cloud Accessories Corporation. The main offices and store rooms of this company are at 1408 South Wabash avenue, Chicago.

The Morgan cord fan belt is built on the principle of a cord tire with a series of small cords next to the wearing surface, and five larger, heavier cords bordering the outer surfaces, all encased in rubber fabric. The cords give the fan belt unusual strength and the rubber supplies exceptional wearing quality. The Morgan cord fan belt is made in Ford size only for the present. It is guaranteed for one year.

A special weave and treatment gives

Gasoline and lubricating oils in Morocco may be purchased at practically the same prices as in most European countries.



D. G. Caywood, New Northeastern District Manager, Black & Decker Manufacturing Company.

at 169 Massachusetts avenue, Boston, Mass., in charge of D. G. Caywood as northeastern district manager.

A service station for Black & Decker products will be maintained at the same address to give prompt and efficient service for the New England trade.

TO MAKE ALUMINUM BODIES.

The Smith Springfield Body Corporation, Springfield, Mass., succeeding the original Springfield Metal Body Co., will make high grade aluminum bodies the exclusive output of a new 500 by 90 foot factory at West Springfield, deliveries to start June 1. Harry G. Fisk, treasurer of the Fisk Rubber Co., and L. de F. Munger are directors of the company, the other officers being: President, Hinsdale Smith; treasurer, Major Arthur P. Smith; secretary, Lieut. Col. C. S. Dame.

KOEHLERS IN NEW PLANT.

The H. J. Koehlers Motors Corporation, which formerly had headquarters at Fourth avenue and Ogden street, Newark, N. J., is now installed in its new plant at Bloomfield, N. J.

Campaign to "Boost" Buffalo

(The following letter was sent in by a pupil of the Hutchinson-Central high school of Buffalo, N. Y., as a concomitant of the "Boost Buffalo" school campaign.—Ed.)

April 16, 1920.

Editor, The Automobile Journal,
Pawtucket, R. I.

As is customary after every great war, there is a great deal of unrest, uncertainty and uneasiness in the world at the present time. It is only natural that there should be such a state of affairs, for the identical conditions prevailed after the Civil and Revolutionary wars. In the United States at present there appears much of this uneasiness. Wall street, the commanding power of the financial world, is very much upset. All the great industries—automobile, sugar, steel, grain, clothing, lumber and meat—have suffered financial reverses, but shortly everything will gradually come to normal conditions.

In times like these all the cities of the country do their utmost to put their names in the limelight. Every city comes out with its motto or slogan, but the city I am going to talk about has the goods, and it is with the thought of the last word that I venture to say that the name Buffalo will eventually be the first in the automobile industry.

This week of the 17th of April is a very important one for the city of Buffalo, for it is going to be known as "Boost Buffalo Week." Every man, woman and child is doing his or her part to make the name Buffalo one to be proud of. I, a pupil of the Hutchinson-Central high school, the largest and finest secondary school in Buffalo, am doing my bit by trying to boost Buffalo in the automobile industry.

Buffalo, the Queen City of the Great Lakes, has a wonderful location for the automobile industry. It is the eastern terminal of the Great Lakes and is the nearest lake port to Europe. Buffalo is situated near those three important materials—ore, coal and limestone. It is a great railway center, for 17 different lines pass through it. The progress of Buffalo in the automobile industry is remarkable.

At the present time there are the following large concerns here: Pierce-Arrow Motor Car Co., Atterbury Truck Co., Stewart Motor Corporation, Parenti Motor Co., Hewitt Rubber Co., Kelly-Springfield Rubber Co., a branch of the Ford Motor Co. and the H. D. Taylor Co., manufacturer of accessories. In a few months the Dunlop Rubber Co. of England, one of the largest of its kind in the world, will open a large factory in Buffalo. Another large automobile concern likely to open here is the Fiat Motor Co. The last two companies mentioned are foreign concerns, who came to this country to select the best place to manufacture their products. After looking about they chose Buffalo. The reasons given by them are the fine location, cheap power, good transportation and raw materials at hand.

There is a saying that birds of a feather flock together and this may be applied to Buffalo, for it seems that many automobile concerns are being attracted here. Another aid to these is the encouragement they get from the city officials.

I hope this letter will be of interest to you. May I ask that you will cooperate with me in any way you may find possible in making Buffalo the automobile city.

TRAIN LOAD OF MOTORS.

The Lycoming Foundry & Machine Co., Williamsport, Pa., recently shipped a train of 28 cars loaded with 2394 motors for the Dort Motor Car Co., Flint, Mich., stated to be one of the largest single shipments of motors ever made.

RIGHT OF WAY LAW OPERATIVE JUNE 29 IN MASSACHUSETTS.

The so-called "Right of Way" law, providing that when two vehicles approach the intersection of streets at approximately the same moment the one approaching from the driver's right shall have the right of way, is to become operative on June 29 in the State of Massachusetts.

It is believed by those who petitioned for this law, which was passed by this year's Legislature, that when it is once in effect Massachusetts will have taken a very important step toward eliminating and fixing the responsibility for automobile accidents at these points.

The petition for this measure was filed by Representative John A. White of North Brookfield, and its adoption has been agitated for years. It is modeled upon similar laws in Connecticut and New Jersey, which have worked successfully for several years.

Once this law is operative it will only be necessary to look out for the man on your right in approaching a street corner and to give him the right of way.

ADVERTISING AGENCY CHANGES NAME.

The Dooley-Brennan Co., advertising agency of Chicago, has just changed its name to Conover-Mooney Co., although the change in ownership was made more than a year ago. The officers are as follows:

President, Robert Johnstone Mooney; vice president, Harvey Conover. Other well known advertising men associated in the concern are John F. Sowers, long with N. W. Ayer & Son and the Clague agency; John A. Simpson, formerly vice president of the Reismann agency; William Clendenin, Harry B. Cohen, J. L. Brennan and R. C. Groh.

The offices of the company are in the Harris Trust building, 111 West Monroe street, Chicago.



Tommy Milton, Who Made Sensational Speed Records at Daytona Beach.

Milton Makes New Speed Records

In a sensational finish with flames bursting from beneath the hood of his twin eight Duesenberg racer of 600 cubic inch capacity, Tommy Milton reduced his own world's records for one and two miles on the Daytona Beach, Fla., straightaway track April 27.

The mile was made in 23.07 seconds, or at the rate of 156 miles an hour. The second mile was made in 23.17 seconds, making the two miles in 46.24.

Milton steered his car into the ocean, after slowing down, to drown out the flames. The racer was shod with Good-year tires.

Milton's previous record included the winning of the Elgin road race in 1919 and the holding of a majority of the world's racing records, comprising all distances from 10 to 300 miles. He has entered the lists for the eighth international 500-mile sweepstakes on the Indianapolis Motor Speedway, Monday, May 31, as a member of the Duesenberg combination, his team mate being Jimmy Murphy, his protegee, who captured the inaugural race on the Los Angeles Speedway a short time ago.

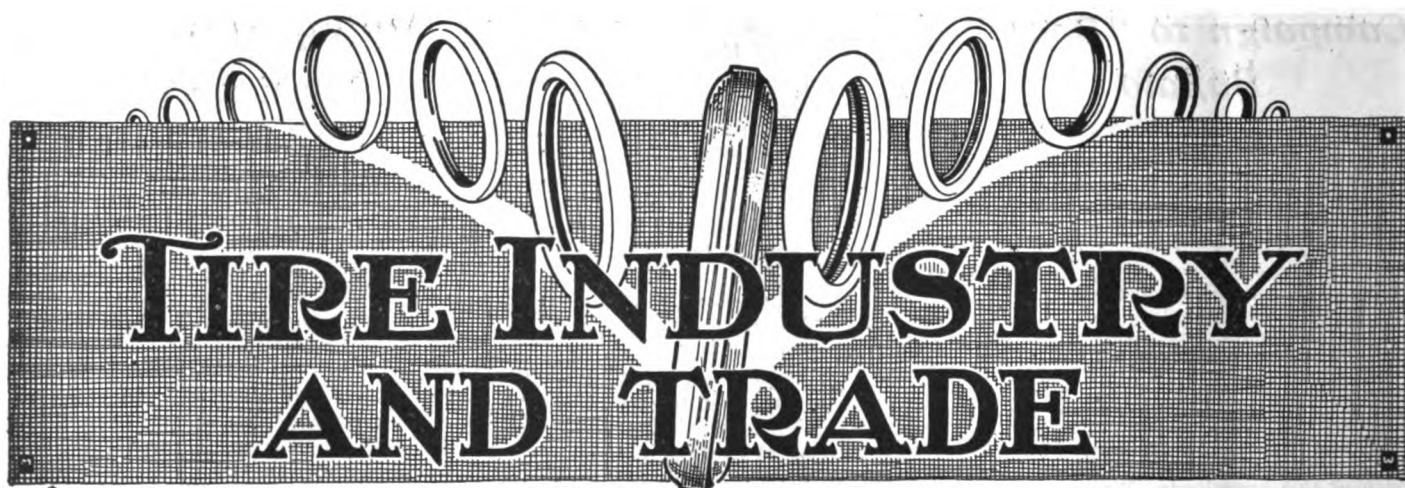
JEFFERSON ELECTRIC INCREASES PRODUCTION FACILITIES.

The Jefferson Electric Manufacturing Co., 426-430 South Green street, Chicago, has leased additional manufacturing floor space, which will enable it to double its production of Jefferson products, including ignition coils for every requirement of the automobile, truck, tractor, gas engine, motor boat and motorcycle and the Combination spark plug, Auto lamp and Ford Unit tester, Ford magneto lamp regulator and electrical transformers of every description, bell-ringing, toy, sign lighting, wireless and Auto transformers, as well as custom made transformers of any size and style.

"SINCLAIR OILS" FOR MAY.

"Sinclair Oils," the house organ of the Sinclair Refining Co., Chicago, offers in the May issue a particularly interesting series of articles and illustrations, among the topics treated being the following:

"The Refineries," E. W. Isom, vice president, Sinclair Refining Co.; "The Story of Four Brothers Grease," P. E. Potter, manager manufacturing department, Albany, N. Y.; "Sinclair Marine Service," "Central American Railroad Uses Fuel Oil," "Efficiency, Loyalty and Cooperation," E. A. Kermott, division accountant; "Crude Petroleum," Joseph E. Pogue, director of economic research department; "New Devices Introduced by Robert A. King," "Promptness," J. M. Judson, manager credit department; "Denver to Alamosa Via Truck." A group of half tones, introducing the associate editors of "Sinclair Oils," is included, and considerable space is devoted to the activities of the various divisions and refineries.



TIRE INDUSTRY AND TRADE

Recent Promotions by Goodyear Co.

The following promotions have recently been announced by the Goodyear Tire & Rubber Co., Akron, O., in its sales organization: L. C. Gates has been made manager, H. E. Waldsmith branch manager at Akron, and K. H. Dresser branch manager at Newark, N. J.



L. C. Gates, Manager Motorcycle Sales, Goodyear Tire & Rubber Co.

Mr. Gates entered Goodyear employ in a clerical capacity in the assistant division of the automobile tire department in 1915, and in a short time was transferred to city sales work in the Philadelphia branch. His next step forward was to assistant manager at Philadelphia, followed in 1919 by an assignment as manager of the Dayton, O., branch, and his promotion to the management of motorcycle sales at Akron followed early in 1920.

Mr. Waldsmith's first connection with Goodyear was in 1915 as a special traveling representative in the bicycle and motorcycle tire department. In 1918 he was transferred to the automobile tire department, where he remained about a year.

His next promotion was to the position of special representative calling on dealers and motorcycle manufacturers, and on July 1, 1919, he was given added recognition by his appointment as branch manager at Youngstown. In 1920 he was made branch manager at Akron.

Mr. Dresser first became connected with the Goodyear organization in 1912 as assistant manager of the mechanical goods department. A year later he was sent to Portland, Me., as branch manager, where he remained until April 1, 1915. His ability as an organizer was quickly recognized by his selection as branch manager at Springfield, Mass. In the summer of 1917 he was recalled to Akron to act as staff man on motorcycle tires. He was soon placed in charge of the cycle tire department and made so remarkable a record that on Jan. 1, 1918, he was sent to New York and the New England districts in connection with the company's second sale of preferred stock, in which he was exceptionally successful. Mr. Dresser was next attached to the manufacturers' sales department, with headquarters in New York, where he continued until he was made branch manager at Newark early in 1920.

WOOD ASSUMES CHARGE OF GOOD- YEAR GOOD ROADS BUREAU.

C. M. Wood, formerly sales engineer for the H. W. Johns-Manville Co., and a man of wide experience in road engineering and highway construction, has assumed charge of the Good Roads bureau recently established by the Goodyear Tire & Rubber Co., Akron, O., and will devote his entire time to the campaign of agitation inaugurated by that company for the furtherance of good roads and highway construction throughout the United States.

Mr. Wood is a native of Texas. Graduating from Cornell university as a mechanical engineer, he followed engineering work in Mexico and the South and Southwest for eight years, the next 2½ years being spent in sales engineering work for a Chicago cement company. Prior to his affiliation with the Manville company he acted as department manager for the Portland Cement association.

New Quarters for Newport Company

The Newport Tire Co. is occupying its new headquarters at 29th street and Huntington avenue, Newport News, Va. This company handles the Kelly-Springfield and Republic lines of tires as well as Peerless and Chevrolet cars and has



C. M. Wood, in Charge of Good Roads Bureau, Goodyear Tire & Rubber Co.

also installed complete and up-to-date apparatus for pressing on solid tires for heavy work.

The officers of the Newport Tire Co. are: President, Coleman Cutchins; vice president, Robert McGruder; treasurer, J. W. Driver; secretary, John A. Cutchins; sales manager, A. M. Sutton.

MANHATTAN CO. TO BUILD AT MORRISTOWN.

It is reported that the Manhattan Rubber Co., Passaic, N. J., is to build a plant on the Whippany river, near Morristown, to reclaim rubber. Several buildings of reinforced concrete are to be erected and employment will be given to 250 men.

Portage Rubber Co.'s New House Organ

The initial number of the *Portager*, a very attractive house organ, to be issued monthly under the editorship of Clyde S. Thompson, by the Portage Tire & Rubber Co., Akron, O., bespeaks a warm welcome among all Portage dealers, distributors and branches for whose benefit and service it is primarily intended. Its scope and purpose are clearly outlined in the salutatory and the publication promises to be somewhat unique in its field both in the treatment of subjects and matter of make-up.

The "Portage Creed" by John W. Maguire, vice president and general manager, on the last cover page, makes a fitting climax to its contents, as follows:

"To make a tire is not enough; to wrap it and pack it and ship it is not enough; to sell it to the dealer is not enough. We must all cooperate so that the tire will be the best, the handling the best, the advertising the best, the salesmanship the best and our customers the best satisfied users of tires in motor-dom."

NEW FIRESTONE BRANCHES.

The Firestone Tire & Rubber Co., Akron, O., has opened branches, for the distribution of its product, at Duluth, Minn.; Portland, Me., and Denver, Col., bringing the total number of Firestone branches up to 65 in the United States, which serve more than 47,000 dealers.

The company's sales forecast for the present year places the value of its production for that period at \$150,000,000.

HOAGLAND WITH MALAY RUBBER.

The Malay Rubber Co., the new distributing tire company of Cleveland, has retained the services of E. M. Hoagland, formerly western district manager of the Amazon Rubber Co.



E. M. Hoagland, Malay Rubber Co., Cleveland, O.



K. D. Smith, Factory Superintendent, Syracuse Rubber Co., Syracuse, N. Y.

SYRACORD TIRES SURMOUNT FREIGHT EMBARGO.

The Syracuse Rubber Co., Syracuse, N. Y., during the recent freight embargo, used its test car, a Pierce-Arrow "66" for a double purpose, by employing it for the delivery of Syra-Cord tires to dealers to such points as Altoona, Pa.; Cincinnati and Cleveland, O.; Chicago and a number of other cities and towns in the middle west; and at the same time the tires on the machine were given the severest of tests. The tires with which the Pierce-Arrow machine is equipped have now traveled 8000 miles and show little signs of wear. It is also interesting to note that, although 36 by 5½-inch tires are recommended for this model of car, the tires were 35 by five-inch, to make the test more severe.

NEW SALES MANAGER FOR STANDARD TIRE.

W. R. McCarthy has recently assumed the duties of sales manager for the Standard Tire Co. of Willoughby, O., maker of "Tiger-Foot" tires. Mr. McCarthy has been connected for a number of years as branch manager with such well known tire concerns as the Firestone Tire & Rubber, Rubber Products and Portage Rubber companies. His activities have always been confined to the sales department, in which he has gained an enviable reputation as an organizer and executive.

The Standard Tire Co. is erecting buildings to take care of its increased business and the total sales for 1920 bid fair to exceed the allotted quota for that period.

Smith Superintendent Syracuse Rubber

One of the notable instances of success among young men in the tire and rubber industry is that of K. D. Smith, the newly appointed factory superintendent of the Syracuse Rubber Co., Inc., Syracuse, N. Y. Mr. Smith was formerly with the Miller Rubber Co., Akron, O., and has had 11 years' experience in both the chemical and manufacturing end of the industry. From 1909 to 1915 he was engaged in experimental, analytical and research work for rubber corporations of the Akron group. In 1916 he went to the Miller company as a compounding chemist, where he remained until November, 1919, when he joined the Syracuse Rubber Co. Under his supervision production at the Syra-Cord tire plant has been increased from 100 to 200 to 700 a day, and by fall Mr. Smith states, it is planned to again double this capacity.

BURDICK TIRE CO. TO INCREASE PRODUCTION.

The Burdick Tire & Rubber Co., Noblesville, Ind., hopes to have its new plant ready for occupancy by the first of June and, by the last of July, to be turning out 250 casings and 500 inner tubes a day. The new unit will be one story, of brick, 15 by 120 feet. By the end of the present year the company plans to increase its production to capacity, which will be 200 tires and 5000 inner tubes daily, and 450 people will be employed.

REMOVAL OF STANWOOD RUBBER.

The executive offices of the Stanwood Rubber Co. have been moved from 9 East 40th street to 6 East 39th street, New York City.

Since August, 1914, hourly earnings at the Goodyear plant at Akron, O., have increased at the rate of 119 per cent.

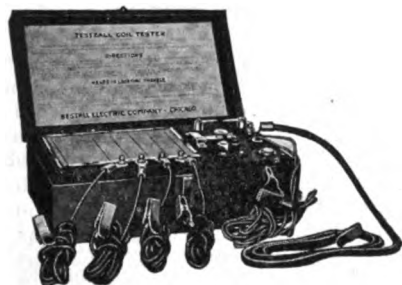


W. R. McCarthy, Sales Manager, Standard Tire Co., Willoughby, O.

ACCESSORIES DEPARTMENT

The Bestall Coil Tester has been designed for the service station repairer, its chief feature being that coils that have become short circuited or damaged can be tested on the car without the necessary work of removal. This feature proves a time saver in determining what is wrong with the coil and makes testing practically an instantaneous operation.

The equipment is compact in the extreme, the entire outfit measuring only 11x6x4 inches, put up in a neat mahogany



finished, nickel trimmed case and equipped with all the necessary wire leads with slip and clip terminals.

The simplicity of the equipment is unusual in view of its high efficiency.

Manufactured by the Bestall Electric Co., 14 East Jackson boulevard, Chicago, Ill. Prices and literature on application.

The Roberts Cut Out and Safety Valve is designed to prevent bursting the muffler shell when an excess of raw gas collects in the muffler. The device is equipped with a spring controlled pop valve which acts automatically. When raw or burnt gases enter the exhaust pipe faster than they can pass through the muffler, the pressure opens the spring valve, permitting the gas to pass out without damaging the muffler. As soon as the pressure is relieved the valve automatically returns to its seat.

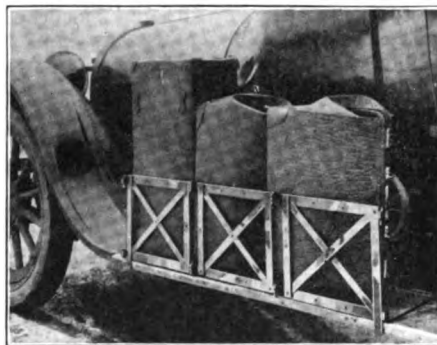


This attachment also serves as a cut out operated by hand control at the driver's seat, which is attached to the valve by a light cable. It is claimed that this attachment can be made to the exhaust pipe without cutting the pipe. The cut out valve is located at the exhaust end of the muffler and when open there is a clear, unobstructed passage for the gas. The device is stated to be leak-proof and will not rattle or work loose. The attachment can be very easily made in a few moments time, as all that is necessary is to remove the old muffler head and loosen the nut on the center rod.

Manufactured by the G. E. Roberts Co., 172 Fifth Street, Milwaukee, Wis. Prices on request.

"Kompak" Luggage Carriers are designed to be fastened to the running board of the car, to carry the extra luggage of the occupants. The carrier consists of three sections joined to each other by hinges which fasten in a vertical position to the edge of the running board. Metal strips slip under the running board at the ends of the carrier frame, while the fastening bolts fit the top of the running board.

The device can be folded compactly for storing the car, and when wanted for use can be opened and extended in a few



minutes time. The manufacturer states that the fastening device is so simple that a child can operate it, the luggage being held in position securely by the upright frame and the fastening device.

Manufactured by the Bersted Manufacturing Co., 765-771 Mather Street, Chicago, Ill. Price, \$4.50.

The K. P. Rim Tool is designed for the rapid removal or replacement of the tire on the demountable rim, locking the rim in an open position when removing the tire and holding the rim in such a position when replacing the tire that the tire and tube are easily slipped on to the rim without the use of other tools. It is stated that tube pinching is done away with when this tool is used, as it is unnecessary to use a tool to pry the tire on or off the rim. The device consists of two adjustable jaws which can be clamped firmly to the rim at either side of the break, and are drawn up tight by two

thumb screws and two bolts passing through the sides of the clamp jaws. The jaws are connected to the handle by two toggle connections in such a manner that the pressure exerted on the handle will open the rim and pass one end over the other, freeing the tire from the rim and allowing its removal.

The manufacturer states that this tool



fits all sizes and makes of rims, including the Kelsey, Stanweld, Firestone, Goodrich and Baker, and locks the rim in a collapsed position while the tire is being removed or replaced.

Rapping the inside of the rim at the point where it is fastened will loosen the locking device and cause the rim to open easily, it is claimed.

Manufactured by the K. P. Products Co., Inc., 250 West 54th Street, New York. Price at dealers, \$4.

New Carbon Proof A C Plug for the Ford Car differs from the regular A C plug in the grade and shape of the porcelain used in its construction, which, it is stated, will not be cracked by heat and is superior, as it prevents the current from leaking through the insulation.

The plug is of the familiar one-piece construction adopted by the A C company as standard, having the porcelain insulator embedded in the steel bushing. The lower end of the insulator is tapering in shape towards the tip of the center electrode, the end for about one inch having



a corrugated surface. It is stated that plugs constructed in this manner will not show short-circuiting defects nor will they collect carbon readily. The corrugated or saw tooth edges, it is stated, attain a sufficiently high degree of heat to burn away the carbon formed on them, thereby keeping the edges free from deposits and breaking up any short circuit.

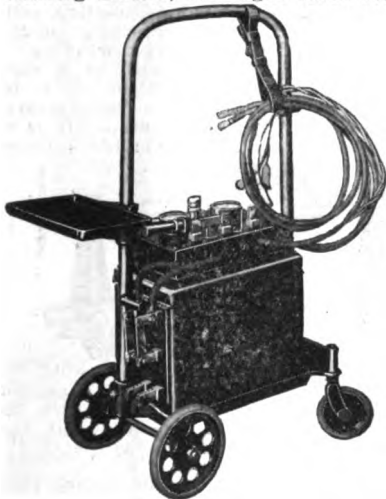
Manufactured by the Champion Ignition Co., Flint, Mich. Price, \$1.

(When Writing to Advertisers, Please Mention the Automobile Journal.)

Model TF-500 Electric Portable Test Unit consists of a unit designed and built for detecting defects in the electric equipment of passenger cars. It is a "first aid" or trouble shooter for use in electric and battery service stations and garages. Motors, generators, ignition distributors, coils, relays, ammeters and switches may be tested without removal from the car. By means of an external battery and precision meters assembled with the necessary leads, it is possible to give quick and accurate service.

This model consists of a double six-volt battery with special double-pole, double-throw switch, Weston ammeter, double-reading, ranges 30-0-30 and 600-0-600; Weston voltmeter, 0 to 15; single-pole, double-throw switch; carrier for motor, generator and tools; mounted on a rubber tired truck.

The method of testing is very simple. Two heavy leads are provided for testing starting motors, two light leads for gen-



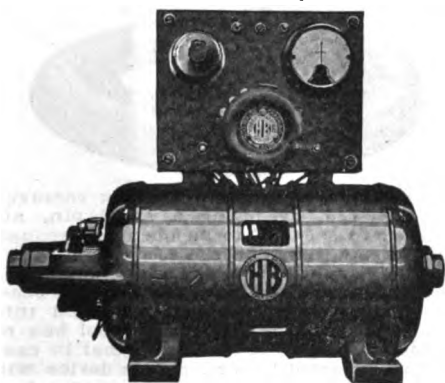
erator and ignition tests and one light lead for recording voltage.

The double six-volt battery permits the testing of both six and 12-volt systems, the operation being controlled by a switch mounted on the battery box. The double-range ammeter allows full range of meter for testing both motors and generators.

With this unit, it is stated, the service station sells "service" instead of time, conserving the patience of the car owner and his time. The unit, it is claimed, eliminates makeshift methods and introduces standardized scientific service.

Manufactured by the Service Products Co., Springfield, O. Prices and literature on request.

The New HB-250 Watt Battery Charging Outfit is especially designed for the small garage that wishes to give service to customers only, and desires a dependable, continuous operating outfit that is economical to install and operate. It en-



ables the small garage to give the complete battery charging service that customers demand, and its economy of operation allows the garage to make a big profit on a small investment.

This sturdy little outfit, though much

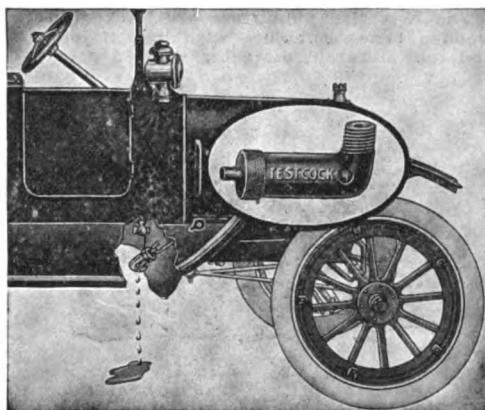
(When Writing to Advertisers, Please Mention the Automobile Journal.)

smaller than the other products of this manufacturer, maintains the same special features throughout as the rest of the line ball bearing equipment, automatic voltage control, allowing different voltage batteries to be charged at the same time, ample capacity for the rating, and complete panel board, mounted on top of the motor generator.

Manufactured by Hobart Brothers Co., Troy, N. Y. Prices and literature on application.

The "Test Cock" for Ford Engines is a small device that screws into the lower crankcase in place of the lower petcock and is used for testing the oil in the base of the Ford engine. A wire is connected to the plunger of the test cock, passing out through a hole drilled in the apron at the side of the car and terminates in a ring, by means of which the operator can open the cock when testing the oil.

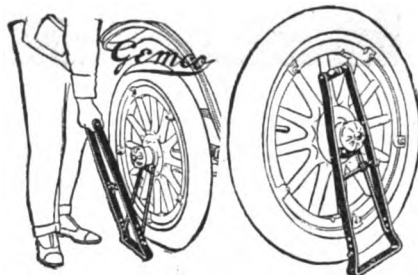
The test cock is made of brass, with the exception of the valves, which is of



cold rolled steel. It is stated that the device cannot break, clog or get out of order, and will last indefinitely. As shown in the illustration, a small hole is drilled in the test cock slightly above the elbow, through which the oil flows when the plunger is pulled out.

Manufactured by the F. L. Huber Co., 219-221 North Channing Avenue, St. Louis, Mo. Price, \$1.

The Gemco Tire Saving Jack is designed to raise the car wheels from the floor of the garage, taking the weight of the car off the tires. The jack is made entirely of steel, with the exception of the hub saddle, which is covered with harness leather to protect the hub and cap from being marred. The jack is easily placed in position and can be adjusted to fit dif-



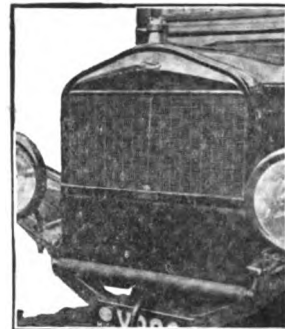
ferent sized wheels. A lock is provided which holds the jack in place after the wheel has been raised. Four jacks comprise a set. They are made in three sizes, as follows: Small, adaptable for Fords and other light cars; next larger for cars weighing 1800 to 2400 pounds; largest, for cars over 2400 pounds.

Manufactured by the Gemco Manufacturing Co., Milwaukee, Wis. Prices, \$4.50, \$5.50 and \$7.50 respectively per set.

The Mayhew Curtain for Ford Cars is an adjustable radiator shield of the roller curtain type, controlled from the driver's seat by a cord running through the dash, over the top of the engine, passing

through a tube inserted in the top of the radiator core in an air passage and connecting with the cross bar of the flap at its top.

The flap is fastened to the sides of the radiator by supports similar to those used for suspending a roller window curtain, the roller operating similarly to an or-



dinary curtain roller. The flap is raised and lowered and caught at any desired point and may be operated when the car is in motion.

The Mayhew Ford curtain is made of the best of materials throughout. Its use is primarily for quickly warming up the Ford engine, after which the flap can be lowered to any desired position.

Manufactured by the Sutter-Mayhew Co., 174 Canfield Avenue, Detroit, Mich. Prices on request.

The Victor Service Cord Tires, known as "Mileage Hogs," are composed of six layers of heavy cotton cords, criss-crossed to neutralize road shocks, each cord treated with tough, live rubber gum, which gives it extra strength and resiliency. The large amount of rubber used in the tread of this tire gives it both the appearance and durability of unusual strength. The name "Mileage Hogs" has been given to these tires, it is stated, by users who have been able to get from 8000 to 12,000 miles of service from them.

Victor tires are made from the best material, under ideal manufacturing conditions, and by workmen skilled in tire



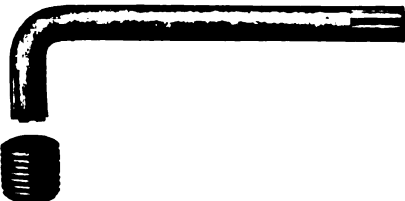
**MILEAGE
HOGS**

manufacture. The rubber used is the finest quality Ceylon and Para. The fabric is specially woven for strength and lasting qualities. Victor tires are guaranteed for positive mileage satisfaction and it is stated that the users forget the guarantee as the tires are built to outlast it, and that mileage is the only real basis of adjustment.

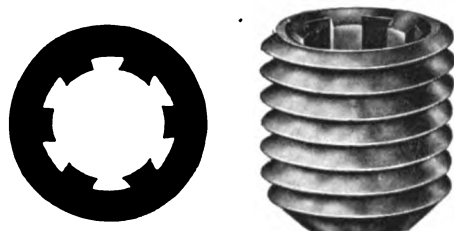
Manufactured by the Victor Rubber Co., Springfield, O. Prices and literature on request.

The Bristo Patented Safety Set Screws were designed to take the place of the many different types of set screws used in the automotive industry and are constructed along lines making them standard for this class of work.

The Bristo Safety Set Screw is equipped with dove tailed slots or flutes into which the corresponding dove tail projections of



the wrench fit. When these screws are being set up by means of this special wrench there is no tendency for the wrench to expand or split the screw, it is stated, even if great pressure is applied to the handle of the wrench, but instead there is a tendency for the wrench to contract the screw on account of the angles at

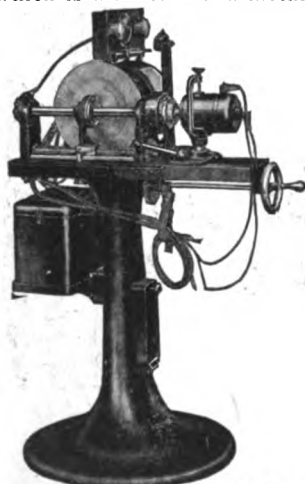


which the faces of the dove tail flutes and slots bear against each other.

Bristo Safety Set Screws are specially heat treated which, it is stated, makes them very tough, insuring long wearing qualities even though the screw is constantly being released and tightened.

Manufactured by the Bristol Co., Waterbury, Conn. Prices and literature on request.

Model TF-1 Electric Test Unit is designed for the quick and accurate testing of generators, motors and the electrical units of the passenger car. It consists of a stand on which is mounted the various units used in carrying out the test, these including a one-half horsepower motor, friction drive, flexible coupling, universal bracket, Weston ammeter, Weston voltmeter and tachometer, all assembled on a base, which is mounted on a metal pedes-



tal. On the pedestal under the base is the double six-volt battery with battery box.

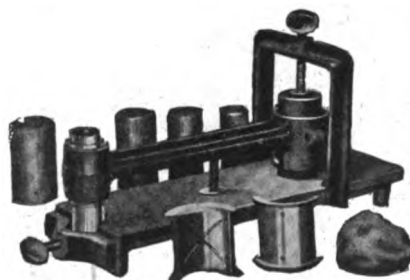
The model TF-1 is a "universal" machine, motor driven, having variable speeds ranging from 0 to 3000 in either direction of rotation. It is furnished with a double six-volt battery with a series-multiple switch for testing both six and 12-volt generators and motors. It has a universal clamp for testing all types of motors and generators in size from four to seven inches in diameter. It is stated that it is possible with this machine to test all types of magnetos. It is equipped

with a universal flexible coupling which, it is claimed, does not cramp the bearings, and a chuck which takes shafts 5/16 inch to 1 1/4 inch and gears 1 1/4 to 3 1/4 inch. Only five leads are used in making all the tests—two for the generator, a voltmeter lead and two heavy leads for starting tests. Instructions for operating the machine on the different tests accompany each machine, so that a repairer who has had slight experience in this line of work will have excellent results, the manufacturer states.

Manufactured by the Service Products Co., Springfield, O. Prices and literature on request.

The N-A Size Babbitter, it is claimed, rebabbitts any size of automobile engine connecting rod bearing up to 12 1/2 inches in length from center to center, and of any bore from 1/4 to 2 1/2 inches. It casts the bearing very accurately to the size required, either solid in the rod or the removable type, and but very little scraping or fitting is required to make a perfect fit on the crankshaft.

The N-A size babbitters are packed in wooden boxes complete with instructions and four different diameter wooden man-



drels as follows: 1 1/4 inch, 1 1/2 inch, 1 3/4 inch and two inch. Other special sizes may be purchased as desired.

Manufactured by the O. A. Bremer Co., 222 Division Street, Burlington, Ia. Prices and literature on request.

The Spring Oiler is a small device that is easily carried in the tool box, for separating and oiling the spring leaves of the automobile. The tool consists of a steel stamping wedge shaped at one end, having a groove cut in the bevel of the wedge through which oil flows and the opposite end fitted with a flat wrench. The wedge is used to open the spring leaves after the car body has been raised with a jack while the lubricant is supplied to the leaves by squirting oil from a cup into the groove the oil flowing in



between the leaves by gravity. The wrench is used to tighten the spring clip nuts, while the thick portion may be used as a light hammer.

The spring oiler is made in two sizes, six-inch for light cars and eight-inch for heavy cars and trucks.

Manufactured by Cochran Manufacturing & Forging Co., 7900 Woodlawn Avenue, Chicago, Ill. Prices and literature on request.

The "Howard" Deflector for automobiles, trucks and motorcycles snaps over the front of any standard headlight and is held in place by three powerful spring steel clamps. A slot a few inches wide and about two inches high allows the rays of light from the electric lamp to show through to illuminate the road, while the rays are prevented from being thrown upward by a half circle hinged cover that may be adjusted either up or down by means of a short brace fastened to the cover at one end and to the upper front of the deflector by a bolt and wing nut. The two holes above the deflector provide

protection to pedestrians on brightly lighted streets. Without the auxiliary holes, it is stated, the car is not perceptible within a distance of 30 feet.

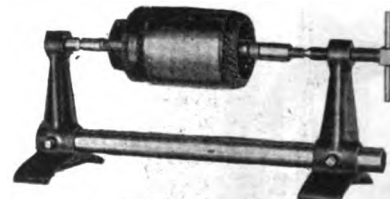


Special instructions are included with the deflectors, describing the different ways in which they may be adjusted on the lamps to get desired results.

Manufactured by the Howard Headlight Deflector Co., Detroit, Mich. Price, \$2.25 a pair.

The Onan Armature Stand is designed to facilitate the work of the electrical repairer of automobile electric starting and lighting systems, in undercutting mica, banding, soldering leads and rewinding.

This device takes the place of a vise for this class of work doing it, it is claimed, in a much more satisfactory manner and with greater speed. It is a bench tool that is adjustable for various



lengths of armature shafts and holds the armature easily, allowing it to be turned freely or with a slight drag as desired. By adjusting the large thumb screw at the end of the shaft the arm may be tightened or loosened as desired.

Manufactured by David W. Onan, 1224 Penn Avenue, Minneapolis, Minn. Price, \$4.50.

The Duplex Rim Device is designed to facilitate the removal and replacement of pneumatic tires on demountable rims. The device consists of two arms and a lever. The arms are shaped on the ends in the form of a hook which fits over the rim, giving a firm grip. Their centers are joined to an eccentric plate at the end of the handle and are operated by movement of the handle, the eccentric motion opening or closing the break in the rim as desired. The rim is held in the open



position while the tire is being removed or replaced, by fitting a small pin, attached to a chain, to an opening through one of the arms and the eccentric plate.

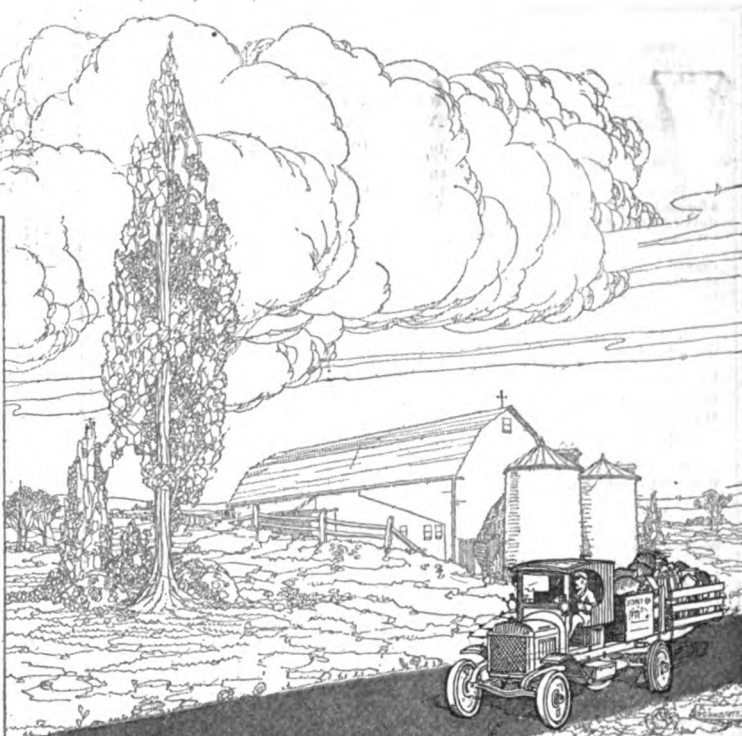
The Duplex rim changing device is made unusually strong for its purpose, and when not in use can be folded into small space and stored in the tool box or under the seat. It is claimed that in case a tire is rusted to the rim this device will open the rim without straining or injuring the sides.

Distributed by the Fairbanks Co., Broome and Lafayette Streets, New York City. Price, No. 1 car size, \$6; west of the Rockies, \$6.50. No. 2 garage size, \$7; west of the Rockies, \$7.50.

(When Writing to Advertisers, Please Mention the Automobile Journal.)



"What did the teamster see
In old days, driving his heavy loads
From farm to town, over hills and prairies?"



A Vision of BETTER ROADS

WHAT did the teamster see
In old days, driving his heavy loads
From farm to town, over hills and prairies,
Through mud and flood and storm and washout,
By wood-roads and highroads and the great
National Highways from State to State,
His strong horses straining and sweating through
dust or mire—
What did that hardy teamster see
On those long, hard roads behind his laboring team?

Across the years he saw a vision,
Prophetic, happy, haunting and inspired—
A Vision of Better Roads in the days that were to be.
He saw broad, smooth highroads running everywhere
in a vast network over the country,
Roads without dust or mud or weariness or the
constant labor of repair,
Roads pleasant and swift to travel,
Roads clean and safe and paved,
Leading to great cities and friends and business and
on adventurous, delightful journeys,
All over this broad, beautiful land.
He saw himself and his wife going and
returning over these fair highways,
Making trips to town for shopping or pleasure;

He saw his boys and girls going to better schools,
and better satisfied with their home;

He saw an end to dreariness and monotony
and isolation;

He saw his produce carried quickly to market, and
anything he needed brought as quickly
back to his own door;

He saw happiness, comfort and prosperity in that
Vision of Better Roads—

The vision of things which his energy and
resourcefulness and courage are today
bringing to pass.

IT was "A Vision of Better Roads"
that brought forth Tarvia—which
has given smooth, dustless, mudless,
waterproof highways to thousands of
communities all over this vast land. If
you are interested in good highways,

write at once to our nearest office for booklets and further information.

Tarvia
Preserves Roads
Prevents Dust

The **Barrett** Company
New York St. Louis Chicago Cleveland
Detroit Minneapolis Dallas Nashville Salt Lake City
Atlanta Leavenworth Duluth Milwaukee Bangor
Baltimore Youngstown Toledo Columbus
Buffalo Richmond Syracuse
THE BARRETT COMPANY, LIMITED: Montreal Toronto Winnipeg
Vancouver St. John, N. B. Halifax, N. S. Sydney, N. S.

STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACT OF CONGRESS OF AUG. 24, 1912, OF

**THE AUTOMOBILE JOURNAL,
PUBLISHED MONTHLY AT PAWTUCKET, R. I.
For April 1, 1920.**

State of Rhode Island, County of Providence.

Before me, a Notary Public, in and for the state and county aforesaid, personally appeared William H. Black, who, having been duly sworn according to law, deposes and says that he is one of the owners of the Automobile Journal, and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management, etc., of the aforesaid publication for the date shown in the above caption, required by the act of Aug. 24, 1912, embodied in section 448, Postal Laws and Regulations, printed on the reverse of this form, to wit:

1. That the names and addresses of the publisher, editor, managing editor and business manager are:

PUBLISHER, WM. H. & D. O. BLACK.....Pawtucket, R. I.
EDITOR, W. W. SCOTT.....Pawtucket, R. I.
MANAGING EDITOR, W. B. WATSON.....Pawtucket, R. I.
BUSINESS MANAGER, WM. H. BLACK.....Pawtucket, R. I.

2. That the owners are:

WM. H. BLACK.....Pawtucket, R. I.
D. O. BLACK.....Pawtucket, R. I.

3. That the known bondholders, mortgagees and other security holders owning or holding one per cent. or more of total amount of bonds, mortgages or other securities are:

M. J. BLACK, Mortgagee.....Pawtucket, R. I.

4. That the two paragraphs next above, giving the names of the owners, stockholders and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company, but also, in cases where the stockholders or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association or corporation has any interest direct or indirect in the said stock, bonds or other securities than as so stated by him.

(Signed)

WILLIAM H. BLACK, Co-Partner.

Sworn to and subscribed before me this 3rd day of April, 1920.

(Signed)

THOMAS BESWICK, Notary Public.
(My commission expires June 30, 1920.)

[Seal]

METZ Master Six

The car of the Year

A New England Product

Honest through and through

**\$1895 F. O. B. factory FULLY
EQUIPPED**

We are now extending our agency list
Information at request

**METZ SALES CORPORATION
BOSTON, MASS.**

GREB RIM TOOL



"Wallop" your rim with a hammer to force it in or out of place and you are bound to have greater trouble next time.

DO THE SENSIBLE THING.

Provide yourself with the best rim tool on the market and save time, trouble and rims.

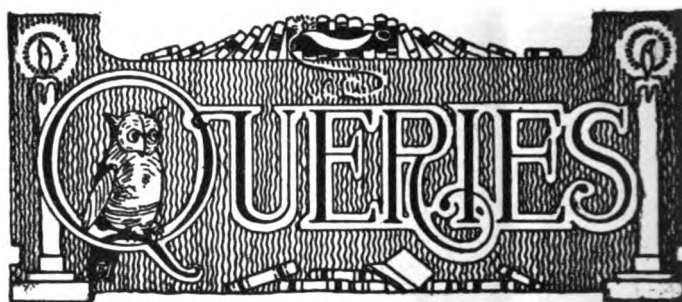
GREB RIM TOOL

You can quickly expand or contract any make of cross-split demountable rim—the Greb is universal and takes them all, especially the Kelsey.

TEN DAYS' TRIAL. If your dealer or jobber does not have them we will send you one. Try it for ten days. If not satisfactory, return it to us and we will refund your money.

THE GREB CO., 201 State Street, Boston 9, Mass.

(When Writing to Advertisers, Please Mention the Automobile Journal.)



REASON WHY CONTACT POINTS DO NOT BURN.

(F. L. H., Long Pine, Fla.)

Please tell me why the resistance unit in the 60-A relay and others of the same type is connected across the relay contacts. Why do these points not burn in view of the fact that there is no condenser?

The relay regulator of the type 60-A is really a combination of a cut-out relay and a current regulator, mounted together on the same base.

The circuits for this type of relay are clearly shown in the illustration. When the generator circuit is first closed the current flows in the field coils through the regulator contact points. It has also a second path through the fine windings of the coil to the ground. This magnetizes the core and attracts the relay armature, thereby closing the circuit through both heavy windings through the battery to the ground. The current in the heavy windings increases the magnetism in the core and locks the relay armature more firmly. This is the normal charging circuit. When the generator speed and output reaches a certain predetermined point, for which the spring on the regulator armature is adjusted, the armature is attracted and the regulator contacts opened. This action forces the field current to flow around through the resistance unit, thereby weakening the field and lowering the current output of the generator. A lowered output decreases the current in the heavy winding, which cuts down the magnetism. This permits the spring to pull the armature away and again closes the contact points. The resistance is thereby cut out again and the field is strengthened. This process continues and results in an intermittent current in the field which regulates the current output to a predetermined maximum point.

There is a high inductance in the generator field coils and the regulator contact points must be protected against burning. This is accomplished by connecting one-half of the resistance across each set of contacts. When the voltage produced by the generator drops below that of the battery, the current is reversed in the heavy winding and the spring on the relay armature pulls the contact apart and opens the charging circuit, thus acting as a cut-out relay.

HEATING GASOLINE FOR BETTER VAPORIZATION.

(H. W. C., Worcester, Mass.)

Kindly tell me through the query column of the Journal whether it is possible to get better vaporization from gasoline on my car by passing the gasoline feed pipe in the form of a coil around the exhaust pipe of the engine. A vacuum tank is used and a Rayfield carburetor, heated by a hot water jacket, and connected with the water cooling system of the radiator.

Have also equipped my engine with a water vaporizer, which is connected to the intake manifold.

The idea is to give the gasoline more heat before it reaches the carburetor, thus vaporizing it more quickly, and getting better mileage.

Service station repairers do not advocate the preheating of gasoline before it reaches the carburetor as you suggest. The reason given is that the present day gasoline is of a poor quality, or many grades mixed together, with the result that the lighter grades rise to the top in the main tank, while the heavier remain at the bottom and are drawn into the vacuum

**40 Per Cent
Cheaper**

**Guaranteed for 6,000 Miles
and 8,000 Miles "On Your
Own Kind of Roads"**

Or Don't You Believe In Signs?

Even if you don't, we think it would pay you to heed the two above. It seems to us that it is pure logic, which would appeal to anyone, that if they could get a tire FORTY PER CENT. CHEAPER, which carries the SAME mileage guarantee, that they would do well to investigate the proposition. We can easily prove the FIRST of the statements; the price list following will more than do that; BUT THE MILEAGE IS UP TO YOU. Put a Bancroft Tire on your car—we've got to make our guarantee good, you know enough of the law to realize that. If you need a GOOD tire, and don't care to pay profiteers' prices, look over this list, and then "Let reason be your guide!"

	Fabric		Cords		Fabric		Cords		Fabric		Cords
30x3	\$12.15	No Cords	34x4	24.53	36x4½	29.00	36x4½	33.00	38x5	35.50	38x5
30x3½	14.70	No Cords	35x4	27.99	37x4½	30.80	37x4½	34.00	39x5	39.90	39x5
32x3½	18.60	No Cords	32x4½	29.00	33x5	32.96	33x5	34.99	40x5	40.90	40x5
34x3½	17.75		33x4½	30.01	35x5	33.99	35x5	36.00	41x5	41.75	41x5
31x4	20.10		34x4½	30.99	36x5	35.20	36x5	37.00	43x5	43.50	43x5
32x4	21.20		35x4½	32.00	37x5	37.31	37x5	39.99	45x5	45.00	45x5
33x4	22.70										

CORDS GUARANTEED 8,000 MILES. FABRICS GUARANTEED 6,000 MILES.

OUR MONEY BACK GUARANTEE—DIRECT AND TO THE POINT:

If upon receipt you are not satisfied we will return your money. Send check, post office or express money order to

Bancroft Tire Company, Suite "A"
15 to 27 Temple St. Record Bldg. Portland, Maine

tank and flow from that point to the carburetor. Heating this gasoline during the summer months does not give the desired results, but for winter driving, when the temperature is colder, it works admirably. Certain cars are on the market where a system somewhat similar to this is in operation, and when the temperature grows warmer such cars have difficulties of their own. They are equipped with a type of carburetor having a glass float chamber bowl, and one can easily see what is happening to the preheated gasoline. It will be noted to be in a boiling state, and will very nearly vaporize before entering the air flue of the carburetor.

Several manufacturers are making different types of electric carburetor heaters that work in conjunction with the storage battery, and are only used for a few moments when starting the engine. Perhaps, when cold weather arrives again, if you would have one of these fitted to your carburetor, it would solve your difficulty, as it is only at the start that warm gasoline is desired. After the engine warms up the heat from the engine keeps the gasoline in the feed pipe and vacuum tank sufficiently warm for operating purposes.

We would recommend that you purchase a good grade of gasoline for the warm months and try the above suggestion later when cold weather arrives, and feel certain that you will get good results.

PROBABLY FULL OF CARBON.

(J. H. M., Northampton, Mass.)

I have a 1917 Ford touring car which runs perfectly except when starting. It takes a lot of cranking to start it and when I stop it the engine backfires. I have ground the valves and still it backfires. How would you remedy this trouble?

You do not mention whether you have scraped the carbon out of the cylinders. The backfiring, after you turn off the ignition, is due to overheating, and if you have not cleaned out the carbon you should do so. It would also be of benefit probably if you would have the magnets recharged at some reliable Ford service station.

(When Writing to Advertisers, Please Mention the Automobile Journal.)

MAGNETO TROUBLE.

(J. A. C., Uniontown, Pa.)

My 1916 car is equipped with a starter that will not turn the engine fast enough to make it start on the magneto that is used. Can I install batteries for starting, using the distributor on the magneto?

An auxiliary battery can be used in connection with this magneto, but you had better consult the service station in regard to the details, as we do not know what model you have. However, we do not think you need the battery, as this magneto, when in correct adjustment, should give a good spark at an extremely low speed. We assume that it worked properly when you first received the car and if so it can be made to do so now without dry cells. Your magneto is of the inductor type and requires very close adjustment between the inductor and the pole pieces, and probably this adjustment has become faulty through wear. At the service station they can probably restore it so that you will have no further trouble.

MAGNETO QUESTION.

(F. M. W., Plainville, Mass.)

I have a gasoline engine equipped with a single-spark ignition from dry cells only. Would it be possible to install a low-tension, belt-driven magneto, using the dry cells to start on and the magneto for running? I cannot use a high-tension magneto, as there is no way to time it. What is the voltage of a low-tension magneto and how should it be wired to the coil? Would there be any advantage in using it?

You could use a low-tension magneto satisfactorily in the manner that you suggest, but it should be equipped with a pulley governor to keep the voltage constant, and it should be a direct current machine. These magnetos are about six volts capacity and one of them would take the place of your dry cells. Your best chance to purchase a magneto of this type is from one of the auto wrecking companies, as they may



ZENITH CARBURETOR

*All That Its
Name Implies—*

THE HEIGHT OF PERFECTION

You cannot secure more efficient and economical carburetion than by the Zenith. Simplest to adjust, and once adjusted stays adjusted.

Known the world over as the

ZENITH OF CARBURETOR EFFICIENCY

A long list of American builders of cars, trucks and aeroplanes believe this simple, plain tube device to be the best insurance for permanent carburetor satisfaction.

Zenith Carburetor Co.

New York Detroit, U. S. A. Chicago



50% additional wear built into your tires after they have reached the point when they are usually discarded. Save what otherwise would be wasted. This is a rebuilding plant operated by skilled workmen, the product of ten years experience building tires at the



Firestone and Goodrich factories.

We absolutely guarantee from three to thirty-five hundred more miles after our work is finished.

Brown Retread Tire Company

70 Clarendon St. Boston



Giant Searchlight

The highest quality lowest priced lamp produced.

LIST PRICE With Mirror.....\$6.00
Without Mirror...\$5.00

CULVER-STEARN'S MFG. CO.

Worcester, Mass.
Detroit, Mich.

The Automobile Journal

A QUALITY MAGAZINE, WITH PRESTIGE AND CIRCULATION THAT BRINGS RESULTS TO ADVERTISERS

TIMES BUILDING :: PAWTUCKET, R. I.

some times be bought from them at low prices. You should fit a three-point switch in some convenient place and connect the magneto to one of the switch points, while the dry cells should be connected to the other switch point, leaving the third point for the "Off" position of the switch. The current from either the magneto or dry cells will then pass through the coil and on into the ignition plug of the engine. The negative side of the magneto and of the dry cells should be grounded to the frame of the engine, while the positive side of each should be carried to the switch points. The circuit will then be complete from the shell of the plug back to which ever unit is supplying the current.

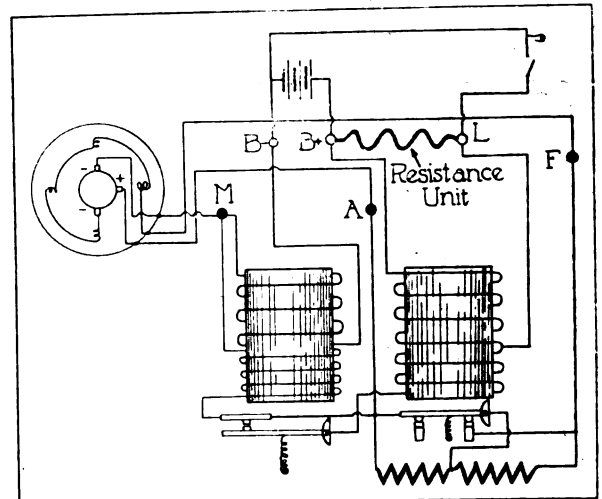
THREE INTERESTING QUESTIONS RELATING TO REMY REGULATORS.

(J. R. J., Sandusky, O.)

In looking over Remy regulator, No. 261, I noticed that it differs somewhat from Remy regulator No. 60-A in certain respects and would like an answer to the following questions:

- 1.—Why is the current for lights taken from the middle of the regulator current winding and not from the end of the winding, or from the positive battery connection?
2. Why is the resistance wire used between the lamp and positive battery relay connections?
3. Why is current first passed through the battery and the lighting circuit before flowing through the current winding of the cut-out relay?

1. The Remy regulator No. 261 varies chiefly from the 60-A type in that it is a constant current relay compensating regulator, while the 60-A is a constant current relay regulator. It is designed to automatically increase the generator's maximum output when under the load of the lighting system. The amperage flowing through the regulator winding determines the point at which the regular will act. With



the lights turned on the entire current generated does not pass through the whole length of the current winding, only that part which goes to the battery, the current for the lighting system passing through the terminal marked L.

In this manner the strength of the winding is reduced in proportion to the current flowing to the lights. With this reduction the regulator contacts will not open until the generator's output has reached a higher point than when acting without the load of the lighting system. This additional output compensates for the current required for lighting.

If the current for lighting were taken from the end of the regulator winding this compensated output would be lost.

2. By locating a resistance between the lamp and positive battery relay connections, this resistance is placed in parallel with the relay winding, thus lowering the total resistance proportionally in the light circuit when supplied by the battery.

The magnetic effect of the current flowing through the current winding before or after passing through the battery and lighting system will be the same. This is optional with the designer.

(When Writing to Advertisers, Please Mention the Automobile Journal.)

STORAGE BATTERY IMPROPERLY CONNECTED.

(R. A. R., Freeport, L. I.)

The generator on my car does not charge the storage battery although I have tightened the connections and examined the brushes. After having my battery recharged it will last for three days. Sometimes when the engine is stopped and I turn on the lights the ammeter shows charge. The negative side of the battery is grounded. Please give me any suggestions that will help.

When the brushes and connections of a generator are known to be functioning correctly and the generator will not charge, very often the trouble is that the field circuit is interrupted. There may be a fuse in your generator field circuit which has melted. Unless the connections of your ammeter have been changed your battery must be reversed or connected to the circuit so that the positive pole instead of the negative is grounded. On most systems it is the positive pole of the battery that is grounded, while others ground the negative. The indication of your ammeter showing charge, when discharge should be shown, proves this point. Changing your battery should eliminate the trouble; if not, examine the generator clutch, where the pump shaft is connected, and note if the generator armature is driving up to speed. Wear here will cause the generator to fail to charge the battery.

REAR AXLE ADJUSTMENT.

(L. J. K., Chicago, Ill.)

I have a Studebaker model 25, 1913, in which I have recently fitted new axles and new gears. When assembling the differential I found that the gears would spin easily. After fitting the axles and wheels and assembling the differential to the transmission I found that there was a decided drag and thought that the brake bands were the cause, but I found that they were free. Kindly tell me through the columns of the Journal what the cause might be.

You will find more or less resistance to the turning of the wheels and axles after the differential housing has been attached to the transmission and the propeller shaft is obliged to turn with the wheels and axles. You have probably done the work correctly, and we would advise you to try the machine on the road and listen for rear axle noises or have some one ride in the rear seat with his head resting on the top of the rear seat upholstery. Axle noises can be plainly heard from this position and possibly located. Or better still, jack up one wheel of the car in the garage, blocking the front wheels so that the car cannot go ahead of the jack, and start the engine, throwing in either the second or high speed. Noises in the differential can be plainly heard and located in this manner. If by chance you have meshed too deeply the large bevel gear and the small bevel pinion, a growling sound will be heard and this can be corrected by loosening the adjustment at each side of the large gear, adjusting them to a point where the noise is eliminated.

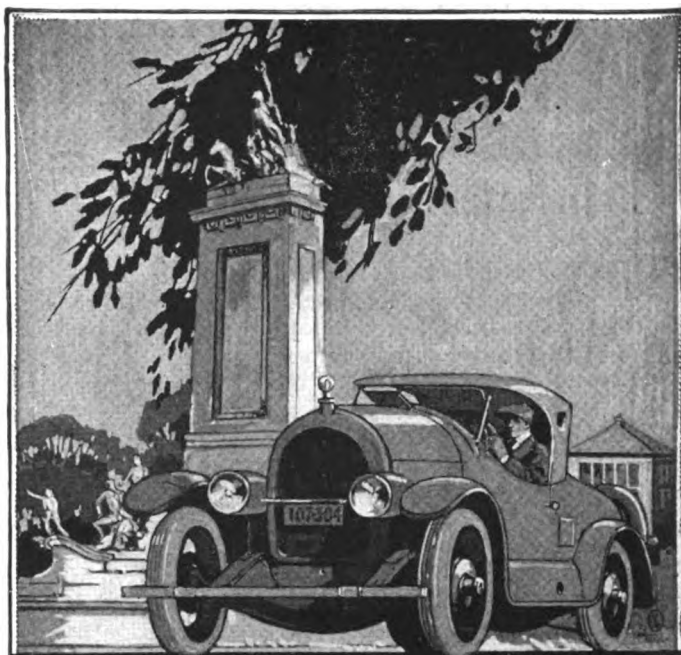
KNOCK IN ENGINE.

(W. R., Providence, R. I.)

There is a knock in my engine which has not been removed by rebabbitting the main bearings and fitting new piston pins. Where do you think the knock is located? Am under the impression that it may be side-slap of the pistons. Had I better have the cylinders rebored and over-size pistons fitted, or will new pistons and rings do away with the trouble?

Quite likely the cause is side-slap. By trying your pistons in the cylinders you should be able to detect any considerable looseness. Any good machinist can determine it by measuring the pistons and cylinder bores with micrometer calipers. If the cylinders are worn enough to give trouble they are probably worn oval and new pistons will not do much good. Reboring and the fitting of oversize pistons is the really effective remedy, but good results may be obtained by reaming the bores to take slightly larger pistons.

(When Writing to Advertisers, Please Mention the Automobile Journal.)

**Avoid Power Waste**

Lubricate your motor with Polarine, the standard oil for all motors. It provides a gas-tight seal between pistons and cylinder walls that keeps every ounce of power right where it belongs—*behind* the piston stroke.

For transmission or differential lubrication, *Polarine Gear Oil* is best.

Buy them both where you get clean, powerful Socony gasoline. Wherever you see the red, white and blue Socony sign.

Standard Oil Co. of N.Y.

(Principal Stations).

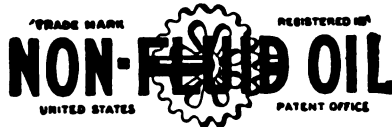
New York
AlbanyBuffalo
Boston

Polarine



Lubricates Right From The Start

THIS is important for much wear takes place on gears and bearings where lubricant has to be softened before it will lubricate as is the cause with common grease.



is adhesive and lubricates from the moment the car starts. Use it on your car. It will give you better lubrication at less cost per month.

*K-00 special for gears
K-000 for bearings*

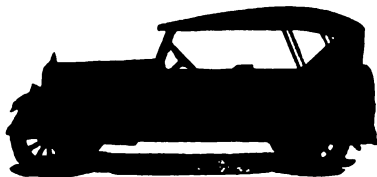
Look for the yellow car with the sprocket wheel trade mark.

New York & New Jersey Lubricant Co.

401 BROADWAY, NEW YORK

5 YEARS CONTRACTS

Write for territory and information on passenger cars and trucks.
Separate contracts.



Winther "Six"

WINTHER MOTOR SALES CORP.
KENOSHA, WIS.

GREB AUTOMATIC GRIP PULLER

A garage and repair shop necessity. Adjusts instantly, grips firmly and cannot unhook. As noted in illustration, it can be made into a two-arm puller. Also has three 12-inch arms opening to 18 inches. The



Grebe Automatic Grip Puller has many uses and will soon pay for itself. Ask your jobber or write for our Ten-Day Trial Proposition. You need this tool in your business.
No. 1 for.....wheels and large gears
No. 2 for.....magnets and generators
No. 3 for.....average gears

THE GREB COMPANY
201 State Street, Boston, Mass.

CARBURETOR TROUBLE.

(F. R. W., Williamsport, L. I.)

In overhauling my light six I had new piston rings put in and a new carburetor of the original make installed, but since then it picks up slowly in high gear and I have to close the choker a few times to make it accelerate. It also burns more gasoline than formerly and the carburetor seems not to give very good results. The car has been driven 3000 miles since overhauling, and the valves have recently been ground. Have you any idea what the trouble is?

Your trouble seems to be either poorly fitted rings or faulty carburetor adjustment. If the rings were not properly fitted the compression quite naturally would be weak and this fact alone would cause your engine to use more gasoline, coupled with the fact that you find it necessary to use the choker more often.

The practise in many repair shops is to fit the rings to the pistons, but not to the walls of the cylinders, with the result that space is left between the ring and the cylinder wall, through which the compression leaks. The object of fitting rings in this manner is to save time and trust to luck that the rings through wear will eventually conform to the walls of the cylinder. A ring that is fitted correctly conforms to the cylinder wall as soon as it is put in. Such a ring should be lapped in with carborundum, grinding it to a fit with the cylinder wall. The main difficulty encountered in performing this class of work is that hours of time are consumed by the service station repairer before the ring is perfectly fitted, and the repairers cut the time down as much as possible in order to accomplish a greater amount of work in a given number of hours.

Possibly your carburetor adjustment is not correct, or is not fitted with a stove and connection to the exhaust manifold. You had better take your car to a service station where mechanics are available who make a specialty of work on your model of carburetor, and have them examine it. They will be able to tell in short order whether or not the adjustments are correct.

FORD MODEL T LIST.

(C. M. C., East Orange, N. J.)

Kindly publish a list showing the year and serial numbers in which the Ford model T car has been manufactured.

The Ford model T car was first manufactured in 1909 and that model has been continued with variations in design from year to year up to the present time. Previous to 1909 other models were made, but records of them are not available. The list given below covers the model T car only.

Year	Model	Cylinders	Serial Number	Price
1909	T	4	1— 11,100	\$850.00
1910	T	4	11,101— 31,900	\$950.00
1911	T	4	31,901— 70,500	\$780.00
1912	T	4	80,000— 147,300	\$690.00
1913	T	4	147,301— 314,800	\$600.00
1914	T	4	314,801— 558,300	\$550.00
1915	T	4	558,301— 855,500	\$490.00
1916	T	4	855,501— 1,362,200	\$440.00
1917	T	4	1,362,201— 2,113,500	\$380.00
1918	T	4	2,113,501— 2,756,250	\$450.00
1919	T	4	2,756,251— 3,277,950	\$525.00

Canadian Ford Motor Numbers.

The Canadian Ford, made by the Ford Motor Co. of Canada, Ltd., located at Ford, Ontario, Dominion of Canada, have their motor numbers prefixed by the letter "C."

Year	Motor numbers
May 1, 1913 to July 31, 1913.....	C-1 to C-1500
Aug. 1, 1913 to July 31, 1914.....	C-1501 to C-16500
Aug. 1, 1914 to July 31, 1915.....	C-16501 to C-37500
Aug. 1, 1915 to July 31, 1916.....	C-37501 to C-70000
Aug. 1, 1916 to July 31, 1917.....	C-70001 to C-121000
Aug. 1, 1917 to July 31, 1918.....	C-121001 to C-170000
Aug. 1, 1918 to July 31, 1919.....	C-170001 to C-208500
Aug. 1, 1919 to Dec. 31, 1919.....	C-208501 to C-230250

Fordson Tractor Serial Numbers.

Oct. 1, 1917 to Dec. 31, 1917.....	1 to 259
Jan. 1, 1918 to Dec. 31, 1918.....	260 to 34426
Jan. 1, 1919 to Dec. 31, 1919.....	34427 to 92113

(When Writing to Advertisers, Please Mention the Automobile Journal.)

STARTER TROUBLE.

(A. M. G., Plainfield, N. J.)

Several times recently my starter has failed to turn the engine over. The electric motor runs, but it does not seem to be able to crank the engine. This trouble has usually occurred when first starting the engine and, after it has been in operation, there is no further difficulty. What is the cause?

You do not state whether your car was recently purchased or whether it has had several thousand miles of travel. In the case of a new car this trouble would probably be caused by the stiffness of the engine bearings and the tight fitting of the pistons to the walls of the cylinders. After the engine has been thoroughly limbered up at the end of about 500 miles of travel, the trouble should disappear, as the bearings should have become free enough for the starting motor to turn it easily. On the other hand, the storage battery may be nearly exhausted and not have sufficient current to turn the engine over. Have your battery tested by a battery repairer and see if the electrolyte does not test below 1200. If it does, this is the cause, and the battery should be removed and recharged from an outside source. A fully charged battery, to do good work, should test between 1250 and 1300 by the hydrometer.

If your car is stored in a cold garage and the oil has a chance to stiffen through the night, this would cause the engine to start hard in the morning, as the stiffness of the oil offers considerably more resistance to the action of the starting motor, especially if the battery is weak.

Examine the battery terminals and note whether or not they are corroded. If corrosion is present remove the terminals and clean with sandpaper, coating the metal with vaseline or kerosene. This will prevent the corrosion from forming for a time, although it will have to be recoated from time to time.

GRABBING CLUTCH, TIMING GEARS NOISY.

(A. L. H., Rochester, N. Y.)

My car, a 1916 Oldsmobile model 43, has been giving me considerable trouble with the clutch grabbing. So much so that the wheels slide when the clutch is let in and sometimes stall the engine. Have applied neats foot oil, which does not seem to help matters. Kindly tell me how this may be remedied and what is the cause of this fierce grabbing.

The timing gears also develop a clatter, sounding as though the gears were running unevenly or had backlash between the teeth. This noise develops at about 12 to 15 miles per hour and disappears when the car speed reaches 20 miles per hour. It is more noticeable when, after traveling around 25 miles per hour, the car speed is cut down to 15 and then speeded up to about 20 miles per hour. Kindly tell me what is the cause of this noise and how it can be eliminated.

A grabbing action of the cone clutch is occasioned either by the leather facing becoming very dry through use, or by wear, causing the rivet heads to protrude above the leather face and come in contact with the cone of the flywheel.

A dry clutch can be restored by sponging off the face of the leather with kerosene and applying a dressing of either neats foot oil or castor oil, till the leather again becomes soft and pliable. If the leather facing is worn down to such a point that the heads of the rivets come in contact with the cone of the flywheel, the clutch will stick, and to restore the clutch it will be necessary to drive down the rivet heads into the leather so as to clear the cone. Leather facing that has become rough or uneven through wear can be restored by rubbing off the high spots with emery cloth, a coarse file, or sand paper, making the surface smooth. A new leather should not be refitted unless you are absolutely certain that the old leather cannot be reclaimed. When new leather is refitted it is best to take the car to some good repairer and have him purchase a facing from the factory and fit it correctly. After the new leather has been fitted it will take some time for it to fit itself to the cone of the flywheel and in the meantime it will require frequent dressings with either neats foot or castor oil.

We are unable to tell you exactly the cause of your trouble as you do not tell us much about the adjustment or the con-

(When Writing to Advertisers, Please Mention the Automobile Journal.)

**NATIONAL ZIG ZAG RADIATOR****The Efficient Radiator
For Ford Cars**

THE great value of National Zig Zag Radiators for Ford owners is in the fact that these radiators contribute so much towards the better operation of the car.

National Zig Zag Radiators are everywhere admitted to be "the most efficient radiator built per pound of metal"—and it is on this basis of better results that they are winning a greater and greater place in sales and demand.

They offer you greater water space, more cooling surface, and extreme contraction and expansion flexibility.

Scientifically constructed throughout National Zig Zag Radiators offer a maximum of efficiency at minimum trouble and expense.

NATIONAL CAN COMPANY

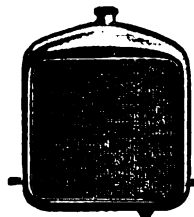
Detroit

Radiator Division

Michigan

Dealers

We are in position now to offer attractive agency propositions. Full information on request.

**NATIONAL ZIG ZAG RADIATOR****Prices**

F. O. B. New York \$28.00 finished in black enamel. \$30.00 finished in nickel. Shipping weight 35 pounds.

V. A. NIELSEN CO.

708 Beacon Street

Boston, Mass.

**We Do Any
Electrical Auto-Repairs****Immediate Return Reliable Work
Absolute Guarantee**

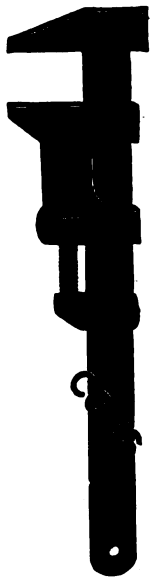
Factory Depot for
Connecticut Ignition
Dealers' Parts List Ready

N. E. Distributors
Stokes Carburetor
Agents Wanted

MAY WE DO YOUR WORK**NEW DEPARTURE
BALL BEARINGS****Strength
Stamina
Service**

The New Departure Manufacturing Co., Bristol, Conn.
Conrad Patent Licensee

COES *The Standard* WRENCH



WRENCHES that are made for the hardest service. They do not break but grip and hold and their efficiency never lessens.

Economy tools as they last longer, give better service and never become useless through wear.

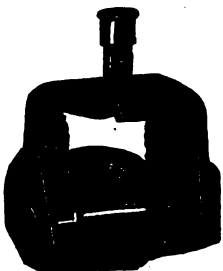
Utility wrenches of the highest order for car owners and repairers as they can be used in compact places and once set hold like a vise.

***The Best Wrench
The Cheapest***

All dealers carry in stock the exact size to meet your need. They recommend Coes Wrenches as all good dealers have for more than fifty years.

COES WRENCH COMPANY
WORCESTER, MASS.

ENJOY SMOOTH RIDING



by keeping your springs lubricated. Brown Oilers automatically filter oil between spring leaves, eliminate rust, stop squeaks and give you solid comfort.

Easily applied. Ask your dealer. Set of 8 oilers, \$10. Money back guarantee.

BROWN SPRING OILER CO.,
6913 Carnegie Ave., Cleveland, O.

PAIGE
The Most Beautiful Car in America

A complete line
of touring and
enclosed models.

Write for Literature.

Paige-Detroit Motor Car Co.

DETROIT, MICH.

dition of the clutch in your inquiry, but we presume that it is the same as many others and answer accordingly.

To reline the clutch on your car it will be necessary to remove the engine, clutch and transmission from the frame of the car, as this model uses unit construction.

To remove the engine from the frame, disconnect from the engine the wires leading to the dash of the car and to the storage battery, tag them and tie them back against the dash. Loosen and remove the radiator and radiator connections after draining the water from the cooling system and lay the radiator on the work bench. Loosen and remove the bolts in the arms at the rear of the engine that fasten the engine to the side frame of the car. Loosen and remove the bolts under the front end of the engine, where the engine is fastened to the cross member back of the radiator. Remove the floor board around the gear shift and emergency brake handles, and loosen and remove the top of the gear set, including the handles and gear shift forks, which will come off with the cover. At the back of the gear set on the drive shaft will be found a Spicer universal joint. Remove the six bolts in the face plate and the drive shaft can be dropped to the floor.

Take a length of either heavy rope, wire cable or a chain and pass it around the engine from the top under the base, making two loops. Slip one of the loops back on the base so that it comes just in front of the flywheel casing. Place the other loop as far forward as possible, and have the two loops cross on top of the engine. Hook a chain fall into the loop and hoist the engine unit from the frame. Have an engine frame handy and place the engine unit on the stand in a position so that you can get at either side or the end.

Disconnecting the Gear Set.

To disconnect the gear set from the clutch, remove the row of bolts around the edge of the bell case where it adjoins the engine case. Disconnect the clutch throw-out collar from the clutch pedal, inside this bell casing, at the collar. The gear set can now be removed from the engine unit and placed at one side. To take out the clutch it is necessary to first remove the housing which carries the clutch collar and clutch coupling. This unit is fastened to the hub of the clutch spider by six bolts. Loosen and take out the bolts and the unit is easily removed. The clutch spring in this type of clutch is removed by displacing the cotter pin in the end of the crankshaft, loosening and taking out the hexagon and cone will allow the ball bearing, spring cap and spring found at this point to be disassembled, permitting the removal of the clutch spider, including the clutch leather facing.

Timing Gear Noise.

The trouble that you are experiencing with your timing gears we believe is due simply to lack of proper lubrication in the timing gear case. A small oil plug is located on the top of this case and at frequent intervals it is supposed to be filled with steam cylinder oil put into the case through the plug opening with a grease gun. This oil is about as thick as molasses and flows very slowly, especially so in cold weather. Two or three gun fulls should be sufficient and we think you will find that the trouble will disappear after this treatment. The gears used in this engine for timing the valves and operating the pump shaft are helically cut, having three teeth always in mesh, so that noise caused from back lash or end play would be practically unknown.

Fitting Leather to Clutch Cone.

In case you wish to try fitting a new leather to the clutch spider, a few simple directions will be given that will enable you to do the work.

- 1—Soak the leather in water.
- 2—Secure one end of the leather to the cone by one copper rivet, placing the leather rough side out.
- 3—With only about three-quarters of the leather on the cone, pin the other end to the cone with a rivet.
- 4—Force the leather on to the cone. It should fit evenly and with uniform tension.
- 5—Drill and countersink the holes for the rivets.
- 6—Rivet the leather in place. Be certain that the rivet heads are 3/32 inch below the face of the leather and well headed on the under side.
- 7—Allow the leather to dry slowly. It will otherwise shrink too much and expose the rivets. A coarse file may be used to remove high spots.

(When Writing to Advertisers, Please Mention the Automobile Journal.)

20 Cents the Copy

\$1.50 the

AUTOMOBILE JOURNAL

DEVOTED TO

OWNERS OF NEW AND USED CARS DEALERS AND REPAIRERS

VOL. LXVII.

PAWTUCKET, R. I., JUNE, 1920.

NO. 11.

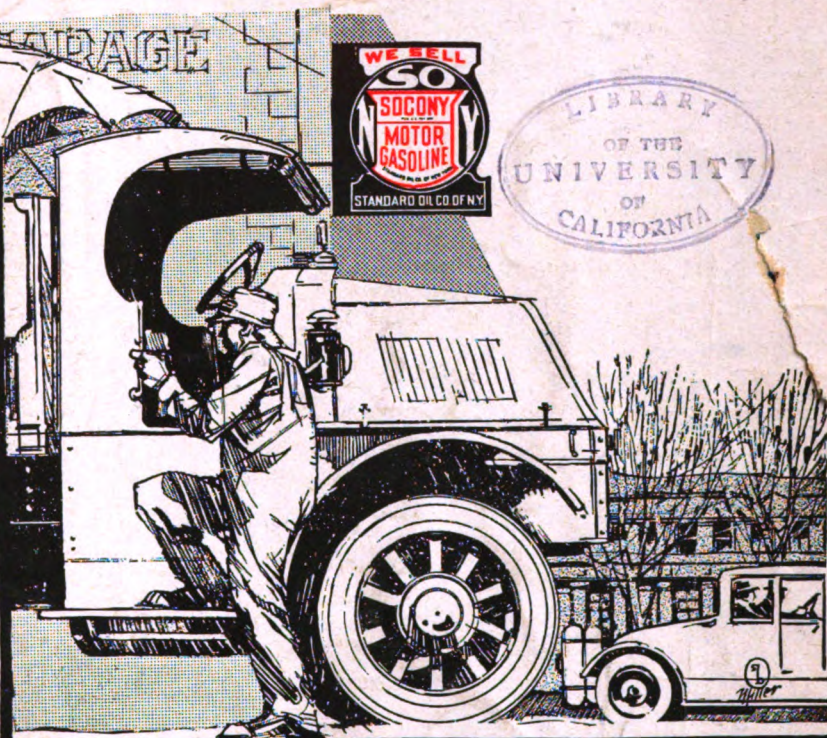
"Great Stuff for Heavy Work"

Starts right away
-has lots of power
-gets there on time
-with quick-fire,
clean-burning
Socony in the
tank. ~ ~ ~

At filling time
look for the red,
white and blue
Socony Sign.



*"Every Gallon
the Same"*



SOCONY

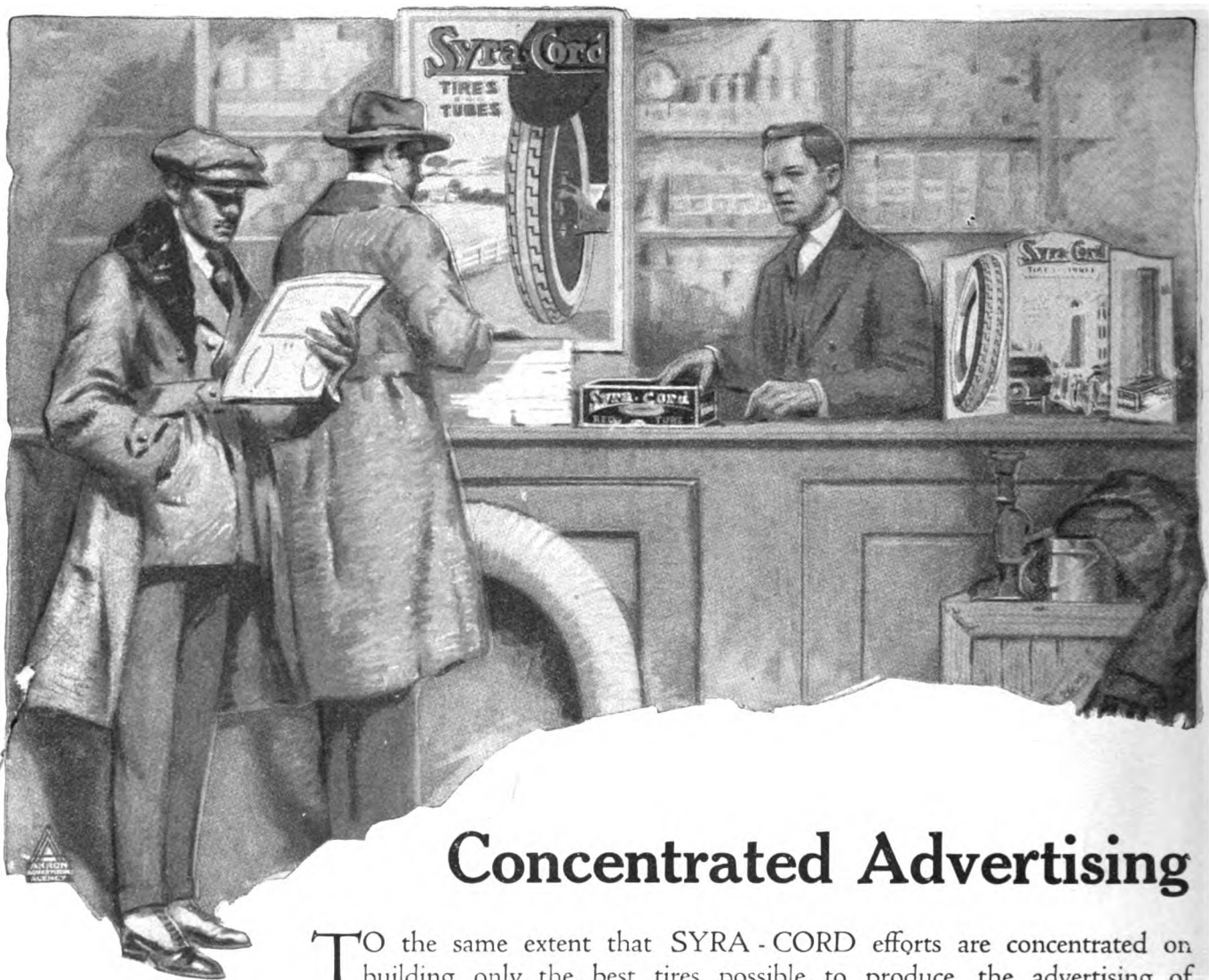
REG. U.S. PAT. OFF.



MOTOR GASOLINE

The sign of a reliable dealer
and the world's best Gasoline

STANDARD OIL COMPANY OF NEW YORK



Concentrated Advertising

TO the same extent that SYRA-CORD efforts are concentrated on building only the best tires possible to produce, the advertising of SYRA-CORDS will be concentrated in territory where are SYRA-CORD Distributors and Dealers.

Distributors who believe in intensive advertising in their own business communities—who want a manufacturer to share advertising expense on a campaign that is now ready—who want exceptionally liberal margin of profit—Write NOW.

Department D

SYRACUSE RUBBER CO., Inc.
SYRACUSE, N. Y.

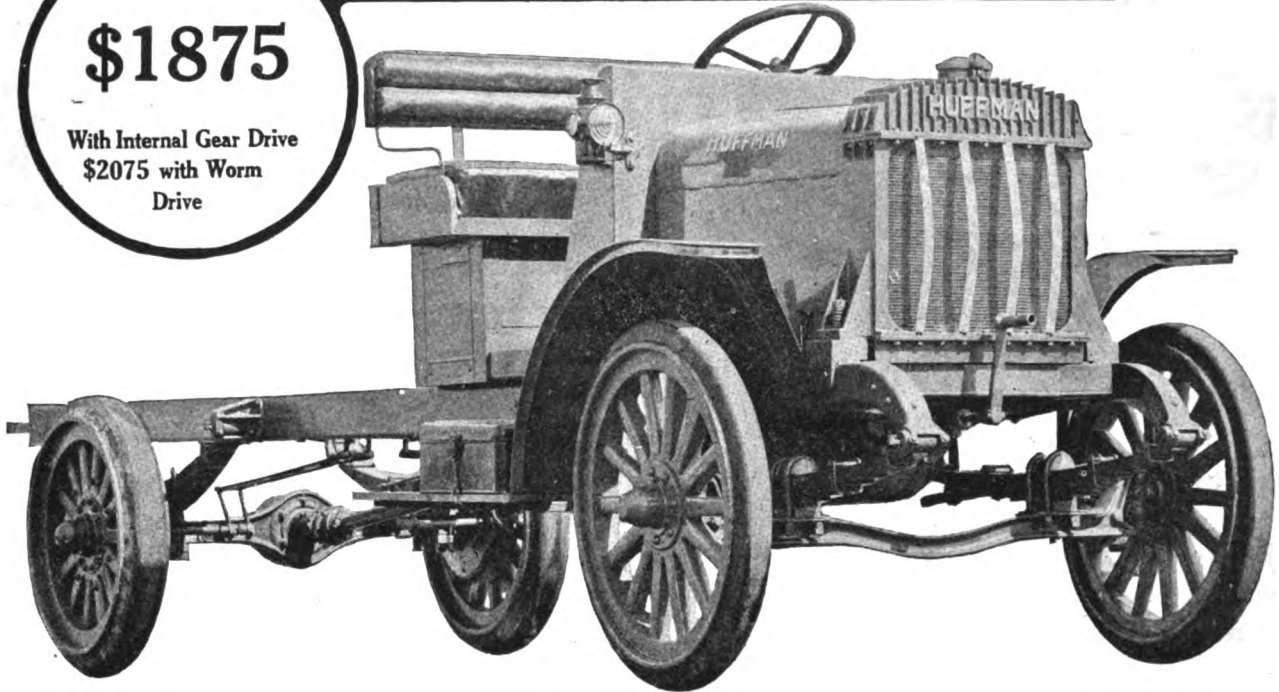
Syra-Cord

T I R E S

The HUFFMAN TRUCK

\$1875

With Internal Gear Drive
\$2075 with Worm
Drive



“NOW’S the time and NOW’S the hour”

Truck buyers are waiting at your door—the “reconstruction period” of American transportation is here—you can “tie up” with the Huffman factory today (if we are not represented in your territory); “tomorrow” never comes. It costs you nothing to FIND OUT about our dealer proposition. You “take no chances” with the Huffman factory organization—it has “made good” with too many dealers to “fall down” with you.

GENERAL SPECIFICATIONS.

MOTOR—Model B 4-cyl. Continental Red Seal.
MOTOR—Model C 4-cyl. Buda.
IGNITION—Dixie High Tension Magneto.
CARBURETOR—Zenith.
CLUTCH—Fuller, dry disc type.
TRANSMISSION—Fuller, Unit Power Plant Type.
STEERING GEAR—Layne Irreversible.
FRAME—Hydraulic Pressed Steel Channel.
FRONT AXLE—Drop Forging with Timken Bearings.
REAR AXLE—Torbenen Internal Gear or Standard Worm Drive.
SPRINGS—Perfection—Special Design.
TIRES—Firestone.
WHEELBASE—140 inches.
LOADING SPACE—10½ ft. from rear of seat to end of frame.
CHASSIS WEIGHT—3200 lbs.

Read the specifications—look at the price—just think of it—\$1695 for a 2000 to 5500 pound carrying capacity truck (including body weight, of course) and you will realize why the Huffman Truck is a “self seller.”

Prospects are waiting to give you money. If you want it wire us today.

HUFFMAN BROTHERS MOTOR CO.

Factory—Elkhart, Indiana

Makers of The Huffman Six—a Family Car

Showroom

2425 Michigan Ave., Chicago

TRADE MARK
EAGLEINE
 REGISTERED
**MOTOR
 OILS**



EAGLEINE OILS

are unequalled for motor lubrication, freer from carbon, economical because they protect the motor against mechanical wear, and the quantity required is comparatively small.

These are the claims of thousands of motorists,—some with years of experience, who want full value, and more who know the value of high grade lubricants, and who know when they obtain satisfaction.

EAGLEINE QUALITY IS INSURED TO YOU

A grade for every type of motor. It is sold in sealed containers.

*Let us send you our new book and chart.
 It is free at request.*

EAGLE OIL AND SUPPLY CO.
 44-45-46 India Street, Boston, Mass.

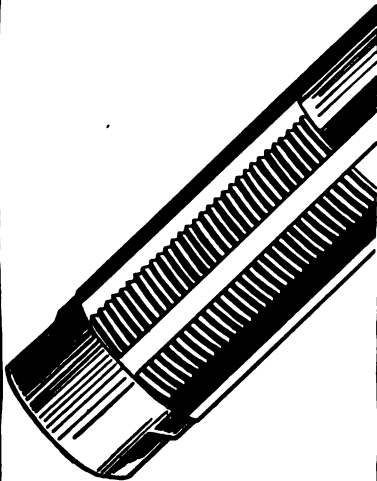
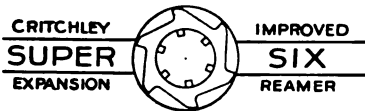
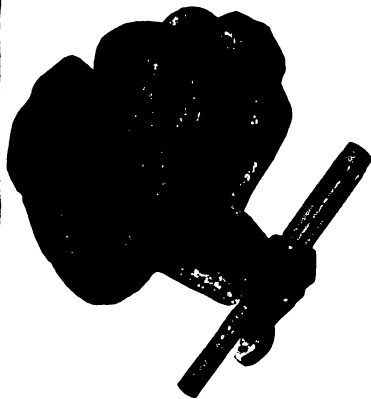
NEW YORK CITY
 Woolworth Building

CHICAGO
 1132 W. 37th Street

**AUTOMOBILE
 JOURNAL**
 INDEX TO ADVERTISERS

	Page
Auto Equipment Co.....	5
Barrett Co., The.....	43
Brightman Auto Exchange.....	3
Brown Retread Tire Co.....	45
Brown Spring Oiler Co.....	48
Coe's Wrench Co.....	48
Connecticut Auto Parts Co., Inc.....	5
Cormack Co.....	5
Cutter & Wood Supply Co.....	3
Detroit Radiator & Specialty Co.....	3
Engle Oil and Supply Co.....	2
Flaherty, Wm. H. Co.....	5
Greb Co.....	44-46
Huffman Bros. Motor Co.....	1
Ideal Tire & Rubber Co.....	6
India Tire & Rubber Co.....	Cover
Magneto and Generator Exchange of N. E.....	5
Metz Sales Corporation.....	44
National Can Co.....	47
New Departure Manufacturing Co.....	47
New York and New Jersey Lubricant Co.....	46
Nielsen Co., V. A.....	47
Northwestern Chemical Co.....	8
Pulge-Detroit Motor Car Co.....	48
Pierce-Arrow Motor Car Co.....	Cover
Standard Oil Co. of N. Y.....	Cover
Syracuse Rubber Co., Inc.....	Cover
Winther Motor Sales Corp.....	46
Zenith Carburetor Co.....	45

USE SUPER-SIX EXPANSION REAMERS



"Critchley Improved Super-Six Expansion Reamers have pulled many a mechanic out of a hole." Ask the men who have used them.

A complete set of these tools will ream accurately any possible sized hole from $1\frac{5}{32}$ in. to $4\frac{1}{16}$ in.

The six blades of high-grade tool steel are slightly staggered to prevent chattering. The binding nuts and the end of the shank are hardened.

Each reamer will expand from .010 to .015 of an inch over its listed maximum size—permitting considerable regrinding before new blades are required.

To be sure of getting the Critchley Improved Super-Six Expansion Reamer, look for the registered trade mark on the wrapper label and our name on the shank of the tool. Ask your jobber,—or write us for price list and descriptive matter.

Cutter & Wood Supply Co.
62 PEARL STREET
BOSTON 9, MASS.

115-1

16th Annual Touring Number 16th



Member A. B. C.—A. B. P.

(June circulation was 21,500)

ISSUED JULY 15, 1920

A National Route Guide and Touring Book all combined in one issue of this magazine.

Three times the regular circulation at no advance in rates.

Edition reprinted in regular book form and copies sold to tourists for 50 cents each. All advertisements are reprinted and published in this book at no cost to the advertiser.

Those who tour are sure buyers—copies are held and referred to at home and while on the road. The publicity value is active for months.

Rates: Full Page, \$100; 1-2 Page, \$55; 1-4 Page, \$30

Type size of page 7 1-4 x 10 inches. 2 columns to page.

Wire Reservations

Rush Copy

AUTOMOBILE JOURNAL PUBLISHING COMPANY

Pawtucket,

Rhode Island

16th Annual Touring Number 16th

TRADE OUTLET



BOSTON'S Finest Equipped Auto Electric Repair Service

With a staff of trained electrical men we can offer auto owners expert service, coupled with promptness and personal attention to all electrical repair problems. We also repair any electrical equipment used on a motor car. Official service and parts representative for

**AUTO-LITE LIGHTING AND
STARTING SYSTEMS.**
Complete Stock of
GENUINE PARTS.

All Work and Parts Guaranteed.

William H. Flaherty Co.

74 CUMMINGTON ST., BOSTON, MASS.

AUTO SAVE 50-90% PARTS FOR 400 CARS

POPE, PACKARDS, PIERCE, BUICK,
STEVENS-DURYEA, KNOX, OVER-
LAND, ETC.

Motors, \$25.00 up	Presto Tanks, \$4.50 up
Magnetos, 4.00 up	New Spotlights, 2.50 up
Carburetors, 8.00 up	Generators, 10.00 up
Rear Axles, 15.00 up	Gears, 1.00 up
Front Axles, 5.00 up	Bearings, 1.00 up
Cylinders, 5.00 up	Radiators, 10.00 up

\$12 Diamond Bumpers.....\$5.50
Jobbers in Bankrupt Auto Supplies.

BRIGHTMAN AUTO EXCHANGE

321 Windsor Ave., Hartford, Conn.

Every Ford owner should read "Transforming the Ford." Tells how to secure smooth, positive brake action that no car can excel. A little "transforming" and your car will glide to a quick, quiet stop without the annoying, irritating clatter that you now experience. It will go into low or reverse without jumping or jerking, and you can pick up speed with all the smoothness and ease of a high-priced car. All accomplished without additional expense and the result is a clear saving of 75 per cent. in one direction alone. "Transforming the Ford" tells how it's done. Send for your copy this very minute. 10c stamps or coin. CORMACK CO., Dept. 57, 500 Fifth Ave., New York City.

AUTO-TOP AND SEAT COVERS

\$7 up—parcel post prepaid. Easy to apply. Catalogue and samples free. Auto Equipment Co., 16 Canal, Cincinnati, O.

AUTO TIRE VULCANIZING, a growing profitable business. Easy to learn. Instruction book \$1. Three weeks, practical school course free. Plants \$50 up. Catalogue free. Equipment Co., 191 Canal, Cincinnati, O.

Magneto and Generator Exchange of N. E.

44 COLUMBUS AVENUE, BOSTON, MASS.

SAVE 50%

Offers——

Quality Service for your car.

Starting, Lighting, Ignition.

One year guarantee on repairs and installations of all makes.

Everything pertaining to Auto, Electricity, Magneto and Generator Parts. We have one of the best equipped shops in New England devoted exclusively to this work.

**BOSCH, SPLITDORF, EISEMANN, DIXIE, BERLING MAGNETOS
and Parts Always in Stock.**



AUTO PARTS.

50% to 90% OFF List.

24 Hour Service. Unlimited Stock.

Pope-Hartford, Columbia, Reo,
Overland and 200 other makes.

Motors, \$20.00 up | E. Presto Tanks, \$4.00
Magnetos, \$3.50 up | B. Presto Tanks, \$4.75
Cylinders, \$3.00 up | Bearings, 50c up
Springs, \$1.00 up | Rims, \$1.00 up

1000 Other PARTS Bargains.

If you want any part not listed here,

Write Us—We Have It.

Conn. Auto Parts Co., Inc.

18-20 Morgan St., Hartford, Conn.

SPEED OR POWER FOR THE FORD.

Install a set of:

2½—1 Gears in the Racy Type

3 —1 Gears in the Roadster

4 —1 Gears in the Delivery

Our Trade Mark—A star on every gear

insures quality.

**DETROIT RADIATOR & SPECIALTY
CO., 968 Woodward Ave., Detroit, Mich.**

RENT OR SALE

**MODERN CONCRETE STEEL
RAILROAD SIDING PLANT**
32,000 SQUARE FEET.

In the heart of Jersey City at the door of the proposed vehicular tunnel; now fully equipped as a machine shop, foundry and blacksmith shop; over 200 machine tools.

15 ton overhead crane.

Complete power plant.

Suitable for machinery builders, auto truck makers, warehouse, etc. Up to date construction. Floor capacity 250 lbs. square ft. BOX 88 AUTOMOBILE JOURNAL.

Lozier Owners—Why buy counterfeit repair parts? We have all Original Parts. Made from original patterns. Order from headquarters.

LOZIER MOTOR CO., Detroit, Mich.

Service Stations—E. A. Cornley, Inc., 1445 Bush St., San Francisco, Cal.
Lozier Motor Co., 47th St. and 11th Ave., New York City.

Send it to Detroit

MAGNETOS.

Bosch DU4 Variable spark.....	\$20.00
Bosch DU-4 set spark.....	25.00
Bosch D4 and Dr4.....	25.00
Bosch D6 and Dr6.....	30.00
Splitdorf 4 cyl. Dixie, high tension	25.00
Splitdorf 4 cyl., Models A, T, X and D.....	10.00
National 4 cyl. low tension.....	8.00
Briggs 4 cyl. low tension.....	8.00
Remy 4 cyl., type R L.....	15.00
Simms SU4 high tension.....	22.00

GENERATORS.

Deaco 6 volt.....	\$12.00
Auto Lite 6 volt.....	15.00

COILS.

Splitdorf T S type.....	\$10.00
Splitdorf box type.....	6.00
Bosch type A.....	10.00
Remy box coils.....	6.00
Remy type LC and LE.....	8.00
Briggs box coils.....	6.00

**DETROIT MAGNETO REPAIRS ARE
BETTER.**

WE REPAIR any make magneto, coil, lighting generator or starter and give 24 hours service. Member Detroit Automobile Trade Association.

Detroit Magneto Exchange

192 Grand River Ave. Detroit, Mich.

Auto Mailing Lists

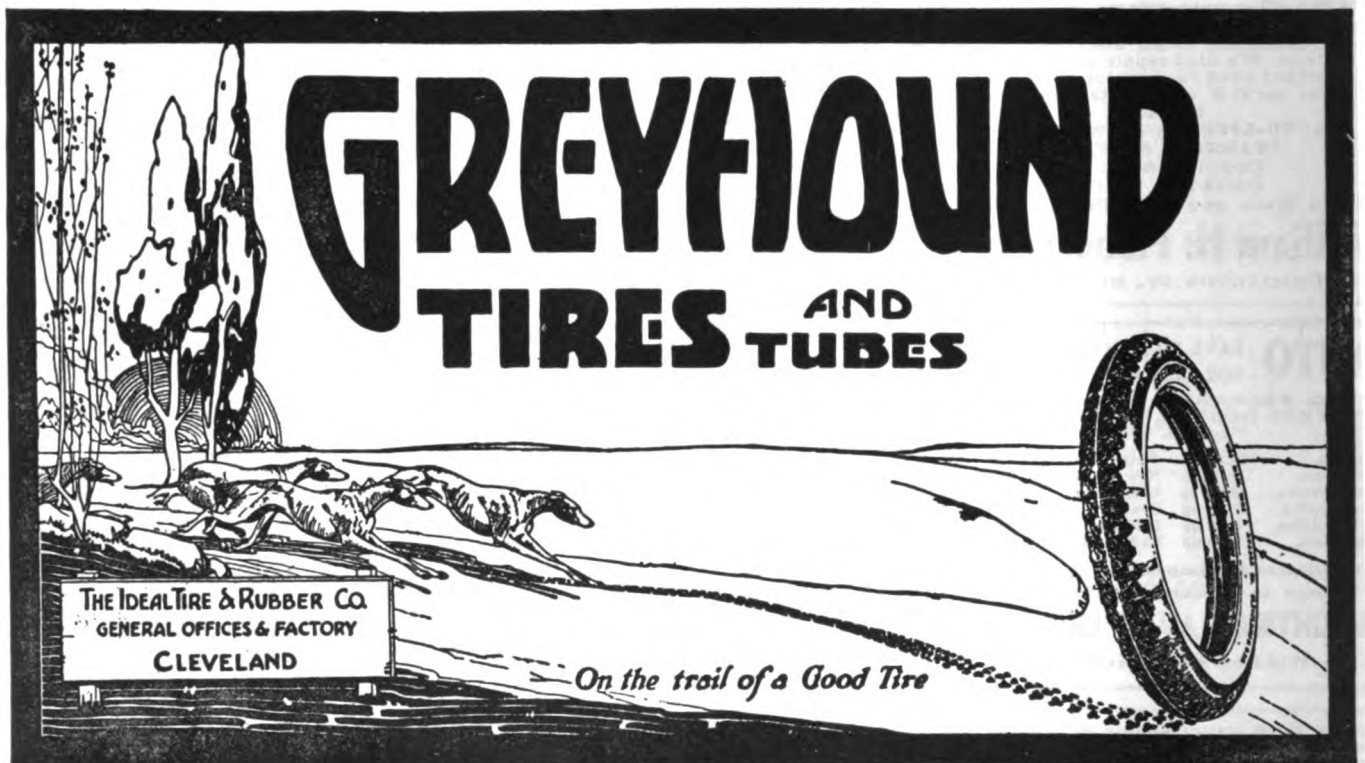
Send for our free complete Price List covering Auto Dealers, Owners, Ford Dealers, Truck Dealers and Owners, Garages, Auto Mfrs. and etc., any state. A. F. WILLIAMS, Mgr. of List Dept. 109 W. Adams St., Chicago. Franklin 1122.

AUTO PARTS—At Your Own Prices. We can supply parts for nearly every make of car. 648 Packards, Interstate Fours, also Truck parts, GMC and other makes.

Write us for Parts. We have them.

**STRANDWAY AUTO PARTS CO.,
192-195 H. St., South Boston, Mass.**

(When Writing to Advertisers, Please Mention the Automobile Journal.)

An advertisement for Greyhound Tires and Tubes. The illustration features a large, bold title 'GREYHOUND TIRES AND TUBES' in the upper center. To the left, a greyhound dog is shown running across a field, leaving a trail of small circles behind it. In the background, there are stylized trees and a sign that reads 'THE IDEAL TIRE & RUBBER CO. GENERAL OFFICES & FACTORY CLEVELAND'. On the right side, a large, detailed illustration of a tire is shown, with a trail of small circles leading from the dog towards it. The overall style is a classic black and white line drawing.

GREYHOUND
TIRES AND TUBES

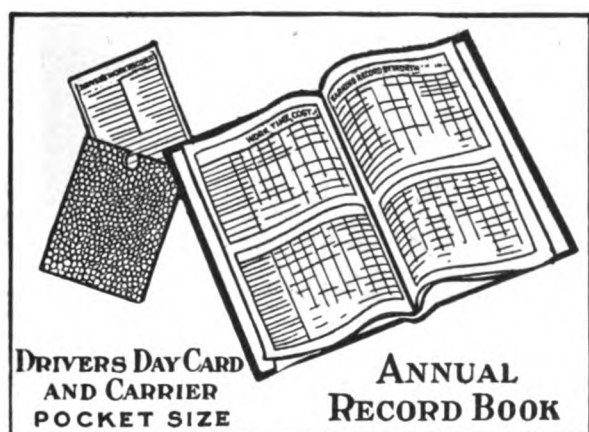
THE IDEAL TIRE & RUBBER CO.
GENERAL OFFICES & FACTORY
CLEVELAND

On the trail of a Good Tire

(When Writing to Advertisers, Please Mention the Automobile Journal.)

Know what it costs to Run your Truck
Learn what your Truck Earns
Know your Truck Profit and Loss

UNIVERSAL MOTOR TRUCK ACCOUNTING SYSTEM



The system includes an annual record book, 350 drivers' day cards, a day card carrier and full instructions.

Any Owner can start this system at any time with an old or new truck of any make or type.

Any boy or girl clerk can maintain all records for one or a hundred trucks.

Each system is good for one year, nothing more is needed or necessary.

The records show at a glance any and all items entering into the earnings and cost of operation.

It is extremely simple. 100% complete and full working instructions are supplied with each system.

It is almost self-operating.

Price \$10 — Delivered

Address Record Department

MOTOR TRUCK

Pawtucket, Rhode Island.

AUTOMOBILE JOURNAL

INDEX To CONTENTS

Published Monthly by the
AUTOMOBILE JOURNAL PUB. CO.
 Times Building, Pawtucket, R. I.

WILLIAM H. BLACK.....Treasurer
DAVID O. BLACK.....Secretary

Branch Offices: New York City, Chicago, Detroit,
 Boston, St. Louis, Cleveland.

SUBSCRIPTIONS:

United States and Mexico (Postage Paid) the year \$1.50
 Canada\$2.50
 Foreign Countries in Postal Union.....\$3.50
 The Copy.....20 Cents

PRINCIPAL FEATURES OF CONTENTS.

	Page
*American Car Wins Eighth International Sweepstakes	9
Milton the Winner at Uniontown.....	12
*News of the Foreign Field.....	13
*The Successful Business Man Is the One Who Keeps Busy—But Not Too Busy, by Lester G. Herbert.....	14
*Humorous Side of Motoring.....	16
*Overhauling the Automobile, Continued.....	17
*Personal News of the Industry in Brief.....	24
*Analogy Between Parts of Automobile and Human Body.....	26
Breaking in the New Motor Car.....	27
*Electrical System of the Modern Automobile.....	28
*Proper Care of the Automobile Lighting System	29
*Women Proficient as Drivers.....	30
Importance of Using a Good Grade of Oil.....	31
*The Motor Car Bearings and Their Care.....	32
*Notes of Trade and Industry.....	33
*Visitors Welcomed at Goodrich Plant.....	35
*Rudisell Heads Overland Tire Co.....	36
*Beautiful Goodyear Hall at Akron.....	36
Growth of Akron as a Rubber Center.....	37
Securities and Crude Rubber Markets.....	38
*New Accessories.....	39
*Mechanical Queries.....	44

*Indicates Article Is Illustrated.



“—draw your own conclusions”

“Gentlemen,” concluded Mr. Fred Hall, President of The Northwestern Chemical Co., “you have just seen how SE-MENT-OL works in badly leaking radiators. Before you is the result—draw your own conclusions.”

Seventeen representative auto supply jobbers, assembled in Marietta, Ohio, had just seen a radiator, spurring water from many leaks, completely and *permanently* repaired in *seven minutes* by SE-MENT-OL. Other conclusive tests proved to them that this self-acting radiator repairer could not clog or injure the cooling system in any way.

This demonstration was concluded by completely renewing the appearance and efficiency of the old and very shabby car with other products of the NORWESCO line.

If your jobber was among those present, he will advise you to *stock* SE-MENT-OL and NORWESCO products and *concentrate* on them. He knows they are *right*.

This NORWESCO demonstration was filmed, and will be shown everywhere through the courtesy of the jobbers.

Northwestern Chemical Company

726 State St.,

Canadian Factory: Montreal

Marietta, Ohio

*SE-MENT-OL retails at 75 cents Liquid or Powder.
One can is enough for even the largest cooling system.*

SE-MENT-OL

The Radiator Repairer Guaranteed for the Life of the Car

(When Writing to Advertisers, Please Mention the Automobile Journal.)

THE AUTOMOBILE JOURNAL

VOL. LXVIII.

PAWTUCKET, R. I., JUNE, 1920.

NO. 11.

American Car Wins Eighth International Sweepstakes at Indianapolis

Gaston Chevrolet in Monroe Special Carries Off Premier Honors in 500-Mile Race May 31.

IN THE presence of nearly 125,000 automobile race enthusiasts, and with no serious accidents to mark a contest that, particularly toward its close, was not without its thrilling incidents and tense moments of excitement, Gaston Chevrolet won victory at the Eighth International 500-Mile Sweepstakes, at Indianapolis, Ind., Monday, May 31, in a Monroe Special, an American-made car designed by Louis Chevrolet, an older brother of the daring and skillful young French driver.

For the third time in the history of this famous motor Derby, the premier honors have been secured by a car made in this country, the previous American winners being a Marmon, driven by Ray Harroun, in 1911, and a National, piloted by Joe Dawson, the year following. And it was particularly a triumph for Indianapolis in that all these winning American cars were built in the city where this famous motor classic is held.

The race itself was considered by experts to be, beyond all question, the best contested that has ever been witnessed. It was throughout a test of skillful driving and generalship, but, so far as spectacular features were concerned, these were conspicuous by their absence until the later part of the race. There was no great belching of black exhausts, none of the deafening roar of former contests, and but little work at the pits.

Story of Race.

The story of the race in brief was as follows: The field of 23 starters made rather a ragged get-away, being well strung out. De Palma had barely crossed the tape when he had to stop for a look at his motor. While he was at the pit, Joe Boyer in his Frontenac, Gaston Chevrolet in a Monroe, Art Klein in a

Place	Car	Driver	Time	M.P.H.
First.....	Monroe.....	Gaston Chevrolet...	5:40:16.14	88.16
Second.....	Ballot.....	Rene Thomas.....	5:43:02.29	87.47
Third.....	Duesenberg..	Tommy Milton.....	5:46:43.38	86.52
Fourth.....	Duesenberg..	Jimmy Murphy....	5:52:31.37	85.10
Fifth.....	Ballot.....	Ralph De Palma....	6:05:19.15	82.12
Sixth.....	Duesenberg..	Eddie Hearne.....	6:14:19.16	80.15
Seventh.....	Ballot.....	Jean Chassagne....	6:15:15.68	79.94
Eighth.....	Monroe.....	Joe Thomas.....	6:21:41.55	78.60
Ninth.....	Special.....	Ralph Mulford....	7:19:03.75	68.33
Tenth.....	Special.....	Tom Alley.....	7:21:40.18	67.93

Frontenac and Jean Chassagne in a Ballot set the early pace well in advance of the rest of the field.

There was little change in positions up

to the 50-mile mark. At this point Boyer and his team mate were leading, with the Frontenacs, with Chassagne in third place and Gaston Chevrolet in fourth position. By this time De Palma had got into the game again and had picked up one after another of the cars in front of him until he encountered Boyer. Then, for lap after lap, came a series of brushes in the long grand stand stretch, with some hair-raising bursts of speed between these two daring drivers on the turns. For at least 50 miles they alternated in the lead with the rest of the field far behind. It was simply a test of skill and speed between them.

De Palma Ahead at 100 Miles.

At the 100-mile mark De Palma had a slight advantage but, on the very next lap, Boyer took the lead once more. Chassagne was in third place. They were reeling off the miles at the rate of 93 an hour.

At 125 miles Boyer and De Palma were still battling for supremacy, and Chassagne was still in third place with Gaston Chevrolet at his heels.

The first important break in the leadership in the race came when De Palma, after covering 192 miles, pulled up for a change in tires. He also took on oil, gasoline and water, and this delay gave Boyer a big advantage, of which he continued to make the most. When De Palma ran in again he had a whole lap to make up on Chassagne and Hill. The field began to dwindle, among the star performers who were forced to quit being Wilcox, Andre Boillot and Jules Goux, driving Peugeots.

There were only 16 cars left in the race at the 200-mile post with Boyer still in the lead. Rene Thomas moved up into second place. De Palma soon recovered



Gaston Chevrolet, Winner of Eighth International 500-Mile Sweepstakes at Indianapolis, May 31.

much of his lost ground and moved up to third place, with the others in the following order: Gaston Chevrolet, Chassagne, Arthur Chevrolet, Milton, Murphy and Henderson. When Gaston Chevrolet turned his 250 miles he was forced to make a stop, making Thomas all the more secure in second place. Boyer made his first stop for oil and gasoline after he had covered 260 miles. This cost him the lead. Thomas moved up into first place, with De Palma and Boyer fighting it out once more, this time for second place. Thomas' lead was short lived, however, as he had to pull up for tires, oil and gasoline.

De Palma Returns to the Lead.

This gave De Palma the lead and the early struggle between him and Boyer was renewed, being the feature of this stage of the race. At about the 325-mile post Boyer had to slow up for a change of tires, and this placed De Palma securely in first place, which he held, and

had to stop to take on fuel, but he ran short nearly in front of his pit and lost but little time.

Interesting Features.

Among the interesting features in connection with this eighth international contest may be noted the fact that of the 23 starters, there was but one six-cylinder car, which was built several years ago; that 10 were of eight-cylinder design, in a line, and the remaining 12 had four-cylinder motors.

All the competing cars, except the six-cylinder, were new designs that had never before competed in a race. The cylinder displacement was decidedly below that of previous years and the cars themselves seemed miniature reproductions of the big speed cars of former races. Yet up to the 470th mile, when De Palma met his reverse, the average speed of the contest was far above the record. That in itself speaks for the speed ability of the cars. But there is

cars to finish had Delco ignition, magneto ignition being used on the three French cars finishing.

Career of Winner.

Gaston Chevrolet, the winner of this year's speedway race, is the youngest of the famous racing brothers, one of whom, Louis, is the designer of the Monroe Special car, which won the race. Previous to last year Gaston Chevrolet had achieved slight fame as a speed driver. He broke the world's record for the 100-mile mark in competition when he won the 100-mile free-for-all Independence Day race at Sheepshead Bay last season with an average speed of 110.5 miles an hour. Later in the year he made an average of 108.95 miles an hour over the same track when he won the 150-mile Labor Day event. Teaming with Joe Boyer he won the 225-mile race at the Uniontown track and was sixth in the list of drivers in all races for the year. He showed marvelous driving ability in the

GROUP OF MONEY TAKERS IN



Second, Rene Thomas.



Third, Tommy Milton.



Fourth, Jimmy Murphy.

at 375 miles he had a comfortable lead of two laps over Gaston Chevrolet and three over Thomas and Chassagne, with Boyer in fifth place. Barring accident, it began to look like De Palma's race. Boyer was forced to make another stop just as De Palma reeled off his 400th mile, but Gaston Chevrolet, Thomas and Chassagne were still going strong.

At this stage De Palma electrified the spectators by making a right rear tire change in exactly 15 seconds. The slight stop did not affect his standing, and he was still in the lead by a margin of a couple of laps over Gaston Chevrolet at the 450-mile mark. Then with a lead of five miles and only 33 miles to go, he met with disaster by running short of gasoline on the back stretch, a mile and a half away from his source of supply. This bit of hard luck cost De Palma the race, as Gaston Chevrolet had no difficulty in moving up into first place, which he held to the end despite the fact that he, too,

still a greater reason in favor of cars of this type—that of safety to the contestants. There was not a serious accident during the entire race, a record almost unparalleled in the Indianapolis 500-mile event, and one which should contribute greatly to the success of such contests.

The purse, \$85,000, was the largest ever offered in a motor car competition. Speed stars of four nations were represented, United States, England, France and Italy, the Big Four among the allies of the recent world war, who now met in strenuous rivalry for the world's premier racing honors.

There were three four-car teams, the Peugeot, Monroe and Duesenberg; Ballot and Frontenac cars were represented by three cars apiece, and Gregoire and ReVeré by two cars each. The Peugeots, Ballots and Gregoires are French cars, giving that country nine representatives.

Another interesting point concerning equipment was that seven of the first 10

1919 Indianapolis race when he was neck and neck with Ralph De Palma and his brother, Louis Chevrolet, until at the climax the wheel of his machine snapped off and he dropped back to eighth place. His first race was in 1916 on the speedway, but he had mechanical trouble and did not finish. In 1917 he teamed with Louis Chevrolet and Joe Boyer in Frontenacs and scored third place in the Cincinnati 300-mile race. He also won two seconds and a third in the short races at Chicago.

Prize Money.

The prize money, \$100 a mile, \$50,000, was divided among the first 10 to finish, as follows: \$20,000, \$10,000, \$5,000, \$3,500, \$3,000, \$2,200, \$1,800, \$1,600, \$1,500. Lap prizes: \$100 a lap, \$20,000, awarded by Indianapolis business men and manufacturers to leaders during race. Accessory prizes: \$15,000, awarded by manufacturers of automobile accessories to winners using their product.

Facts in Regard to Speedway.

Length of course, $2\frac{1}{4}$ miles; area of speedway, 328 acres; capacity of parking space, 10,000 cars; total estimated capacity, 200,000 spectators; greatest previous attendance, 110,000 spectators in 1914; capital invested, \$1,500,000.

Owners and management: President, Carl G. Fisher; vice president and treasurer, James A. Allison; vice president, A. C. Newby; secretary and general manager, T. E. Myers, all of Indianapolis.

Race officials: Referee—Hon. Clifford Ireland, United States Congressman, Peoria, Ill. Starters—William Esterly, Indianapolis; E. C. Patterson, Chicago. Chief timer—Chester Ricker, Indianapolis. Representatives of contest board, American Automobile association—W. D. Edinburn, Detroit, Mich.; W. C. Barnes, Peoria, Ill. Pacemaker—Barney Oldfield, Cleveland.

Present record, established by Ralph De Palma in 1916, time, 5:33:55.51, an

those who have followed up these events as the Jinx year for Ralph De Palma for, in next to the last lap, with a lead of more than 11 minutes, his Mercedes developed engine trouble and the race was easily won by Joe Dawson in a National. There were no fatalities. Dawson's time was 6:21:06, and the average rate was 78.7 miles an hour. The other money takers were: Tetslaff, Fiat; Hughes, Mercer; Merz, Stutz; W. Endicott, Schacht; Zengel, Stutz; Jenkins, White; Horan, Lozier; Wilcox, National; Mulford, Knox.

1913—The season of 1913 marked the beginning of the invasion of European cars, and the race went to Jules Goux in a Peugeot. There was some consolation in the fact that the winning time of 6:35:05 was nearly 14 minutes slower than Dawson's the previous year, the average rate per hour, 76.42 miles, also being 1.78 miles less, and that second and third places were taken by Ameri-

as a racing driver. In trying to avoid running down a mechanic who had been hurled on to the track, Dawson crashed his car into the embankment and suffered serious injuries. The cars finished this year in the following order: Thomas, Delage; Duray, Peugeot; Guyot, Delage; Goux, Peugeot; Oldfield, Stutz; Christiaens, Excelsior; Grant, Sunbeam; Keene, Beaver Bullet; Carlson, Maxwell; Rickenbacher, Duesenberg.

1915—It was not until this year that De Palma became consoled for his misfortune of 1912 by winning first money in 5:33:55.51, at the average rate of 89.84 miles an hour. His greatest rival was Dario Resta, who had already won the Vanderbilt and Grand Prix races, and they were close together throughout the race until within a few laps from the finish trouble developed in the steering gear of Resta's Peugeot and De Palma had a comparatively easy victory.

Although the piston displacement limit

EIGHTH INDIANAPOLIS RACE

Fifth, Ralph De Palma.



Sixth, Eddie Hearne.



Seventh, Jean Chassagne.

average of 89.84 miles an hour.

Facts Regarding Previous Races.

Seven races have been run in the 10 years that the Indianapolis speedway has been in existence, there being no international races in 1918 and 1919, on account of the war.

1911—The first race, this year, was won by Ray Harroun in a Marmon Wasp in one of the most spectacular finishes on record, flashing over the wire only one minute and 43 seconds ahead of Ralph Mulford in his Lozier, with Bruce Brown in a Fiat third; Wishart, Mercedes, fourth; Dawson, Marmon, fifth; De Palmer, Simplex, sixth; Merz, National, seventh; Turner, Amplex, eighth; Belcher, Knox, ninth; Cobe, Jackson, 10th; Anderson, Stutz, 11th; Hughes, Mercer, 12th. The winning time was 6:42:08 and the average rate was 74.59 miles an hour. There was one fatality and several minor accidents.

1912—The race for 1912 is known by

can cars. The piston displacement limit was lowered this year from 600 cubic inches, which ruled for the first two races, to 450 cubic inches. The drivers and cars in the order they finished, were as follows: Goux, Peugeot; Wishart, Mercer; Merz, Stutz; Guyot, Sunbeam; Pilette, Mercedes-Knight; Wilcox, Gray Fox; Mulford, Mercedes; Disbrow, Case; Haupt, Mason; Clark, Tusla.

1914—America was completely out of the running in the spectacular race of 1914 when Rene Thomas in a French-built Delage, set a new record of 6:03:45, nearly four miles an hour better than the old record held by Joe Dawson's National. The average rate per hour made by Thomas was 82.47 miles. This race was, from start to finish, a duel between teams representing two French manufacturers, Peugeot and Delage, and the rivalry was intense. This year was marred by an unfortunate accident which marked the end of Joe Dawson's career

for the 1915 race had been reduced from 450 to 300 cubic inches, not only did De Palma break the previous years' records, but the next three cars did, likewise, all finishing in faster time than Thomas' old mark. The achievement of the Stutz team this year is also worthy of mention inasmuch as all three entries finished in the money. The order of the cars at the finish was as follows: De Palma, Mercedes; Resta, Peugeot; Anderson, Stutz; Cooper, Stutz; O'Donnell, Duesenberg; Burman, Peugeot; Wilcox, Stutz; Alley, Duesenberg; Carlson-Hughes, Maxwell; von Raalte, Sunbeam.

1916—This year the length of the Indianapolis speedway classic was reduced to 300 miles. Dario Resta won it in a Peugeot without any serious opposition from the rest of the field participating. He made the 300 miles in 3:34:15.71, considerably slower, judged on an average miles-per-hour basis, than that in which De Palma had won the 1915 race. The ef-

WINNERS IN FORMER SPEEDWAY RACES.

Year	Driver and Car	Cyl.	Bore	Stroke	Disp.	Time	M.P.H.
1911	Harroun, Marmon.....	6	4 1/2	5	447.1	6:42:08	74.59
1912	Dawson, National.....	4	5	6 1/4	490.8	6:21:06	78.7
1913	Goux, Peugeot.....	4	4.246	7.875	*448.13	6:35:05	76.92
1914	Thomas, Delage.....	4	4.14	7.08	380.2	6:03:45	82.47
1915	De Palma, Mercedes....	4	3.62	6.5	†274	5:33:55.51	89.84
1916	Resta, Peugeot.....	4	3.6	6.6	274	‡3:34:17.51	84.05
1919	Wilcox, Peugeot.....	4	3.6	6.7	274.6	5:40:42.87	87.95

*Piston displacement limit reduced from 600 to 450 cubic inches. †Piston displacement limit reduced to 300 cubic inches. ‡Distance cut down to 300 miles this year only.

fects of the war were manifested in the lack of interest and the fact that the cars entered were below the standard of previous years, there being virtually no new machines in the race. The drivers and cars were: Resta, Peugeot; D'Alene, Duesenberg; Mulford, Peugeot; Christiaens, Sunbeam; Oldfield, Delage; Henderson, Maxwell; Wilcox, Premier; Johnson, Crawford; Chandler, Crawford; Halbe, Osteweg; Alley, Ogren.

1919—After a lapse of two years the 500-mile race was resumed at Indianapolis and while, from the viewpoint of interest and attendance it was a big success, and from a feeling of satisfaction that its winner was an American, Howard Wilcox, as a racing achievement it could not be considered an unqualified triumph. In the first place, with the exception of the Ballot French team of three cars, the entries were all several seasons old and most of them were slow as compared with the offerings of the palmier days of the sport. Had it not been for wheel and tire troubles at critical times the Ballot team would undoubtedly have given a good account of itself. As it was, the moment they were out of the running, Wilcox, in his Peugeot, realized that he had an easy win. There were four fatalities. The winner's time was 5:40:42.87, and the average rate 87.95 miles an hour.

Time for 1920 Slower Than 1915.

It will be noted that while the time this year, 5:40:16.14, was somewhat faster than that made in 1919, it did not reach the 1915 mark by six minutes and 21 seconds, and the average miles per hour, made in 1915, was 1.68 more than this year.

Indianapolis, during the 10 years' ex-

istence of its famous motor speedway, has seen the progress of automobile engineering concentrated within its borders during that decade. In these annual international races that have been so successfully staged in the Hoosier capital city can be traced the gradual development of the multi-cylinder engine, and the growing strength of the light weight car. Europe, through the participation of the best and speediest products of that continent, driven by its most daring and skillful pilots, has benefited mutually with this country, in the trying out of the most advanced designs in motor car construction year after year in the gruelling test of the 500-mile race at record speed.

Thus it will be seen that the mission of the Indianapolis speedway has been not alone to lead the world of sports in point of attendance and interest; it has also served the industry as a clearing house for the interchange of ideas and the exemplification of ideals among the most famous automotive engineers of the world in the interest of progress in the design, manufacture and equipment of the automobile.

OVERLANDS IN ECONOMY RUN.

In the annual 355-mile Los Angeles-Yosemite Economy run, Overland cars on Triplex springs won three of the six cups offered, as follows: Class One, for cars with list price of \$1200 and under, car owned and driven by Henry Amon, first; Class Two, Overland sedan, piloted by Fred Costa, first; Grand Sweepstakes, first and second.

This latter feat was repeated in winning the Baker Economy cup awarded for best economy record in use of oil, gasoline and water. Overland cars finished first, second and third.

The Overland was not only the lowest priced car entered, but it developed the highest record of all-around performance. In Class One the average was 35.4 miles to a gallon of gasoline, including 100 miles in the mountains, while in Class Two the average gasoline mileage was 27.6 miles a gallon.

Milton the Winner at Uniontown

The 225-mile Universal Trophy automobile race at the Speedway at Uniontown, Pa., June 19, was won by Tommy Milton, who averaged 94.9 miles an hour. His official time was two hours, 22 minutes and 44.37 seconds. Jimmy Murphy crossed the line in two hours, 23 minutes and 27.98 seconds, and Eddie O'Donnell, third, in two hours, 26 minutes and 44.45 seconds.

Wade Morton of Philadelphia, driving in place of Willie Haupt, and his mechanic, Arthur Kemps, met with an accident on the 180th lap when a tire blew out and caused their machine to topple and roll down the track. Physicians said Morton and Kemps were not injured seriously.

Milton, who won a prize of \$5000, also won the Universal trophy for the second time. The trophy will be awarded to the driver who wins it three times.

Ralph de Palma had a position with the leaders early in the race, but was forced out on the 122nd lap because of a broken valve. Gaston Chevrolet and Roscoe Saries dropped out shortly after the 100th lap, due to engine trouble. L. P. Fetterman took fourth place, Ralph Mulford fifth, Denny Hill sixth and Joe Thomas seventh.

LIBERTY WINS PERFECT SCORE IN YOSEMITE TOUR.

After entering the New Liberty Six in the Tribune Annual Yosemite tour, one of the best known of the great motor performance tests for which California is noted, A. C. Hull, manager of the F. J. Linz Motor Co. of San Francisco, also decided he would kill two birds with one stone by making the trip an individual oil economy test. Accordingly, he drove the car to the Tribune building before the start of the trip a few days ago, and had Walter Crinnion, assistant secretary of the Alameda County Auto Trade association, seal the cap of the filler tube.

For unavoidable causes Hull was delayed at the start and pulled out in the Liberty 15 minutes after the other entrants had gone. Nevertheless he checked in at Merced at 11 o'clock and at Camp Curry at 5:34, with plenty of time to spare in winning a perfect score certificate. Monday night was spent at Wawona and Tuesday morning Hull swung off the main road to see the big trees, proceeding to Miami Lodge for luncheon at 3 o'clock in the afternoon.

From Miami Lodge the Liberty was headed back to the main road and reached Oakland at 12:30 o'clock Wednesday morning. That afternoon Hull drove the car to the Pacific building, headquarters of the Alameda County Automobile Trade association, where Crinnion read the speedometer and broke the seal on the oil filler. The car showed a mileage of 429 since the filler had been sealed and the oil in the gauge showed exactly one-fourth of an inch lower than it did before Hull pulled out for the Yosemite.

PRIZE WINNINGS.

Driver	Purse	Lap Prizes	Total
Gaston Chevrolet.....	\$20,000	\$1,300	*\$21,300
Rene Thomas.....	10,000	700	10,700
Tommy Milton.....	5,000	....	5,000
Eddie Murphy.....	3,500	....	3,500
Ralph De Palma.....	3,000	3,300	11,300
Eddie Hearne.....	2,200	....	2,200
Jean Chassagne.....	1,800	100	1,900
J. Thomas.....	1,600	....	1,600
Ralph Mulford.....	1,500	....	1,500
Tom Alley.....	1,400	....	1,400
Joe Boyer.....	....	9,500	9,500
Art Klein.....	....	100	100

*In addition to his prize winnings, Gaston Chevrolet received awards from equipment manufacturers which brought his winnings to approximately \$35,000.

NOTES FROM THE FOREIGN FIELD

FLEET OF RAINIER TRUCKS ON JERUSALEM STREETS.

The advance shipment of a large fleet of Rainier omnibuses soon to be seen on the streets of Jerusalem was recently

electric plant in Albania, one installed by Captain O. B. Cohun, an American Red Cross worker, with wires and insulation obtained from salvaged Austrian supplies at Teodo, Dalmatia, and a French motor. The American Red Cross maintains

Train Load of Coles for England

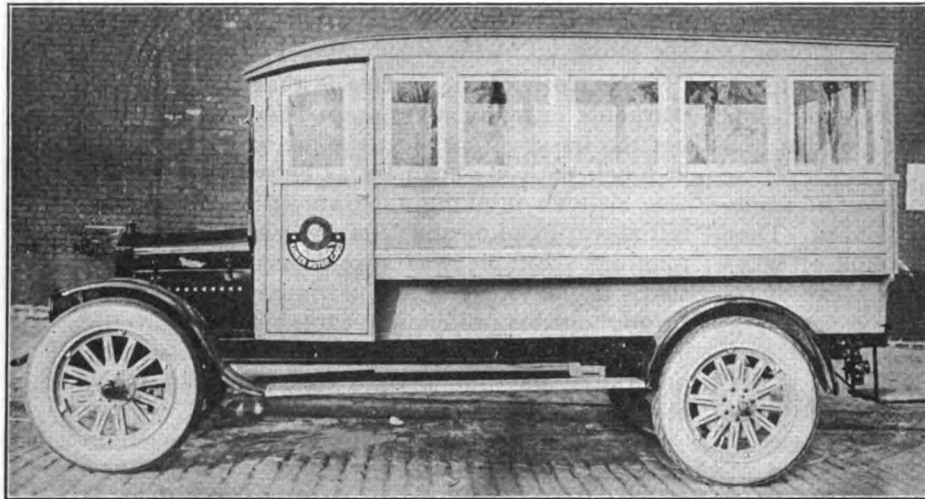
One of the largest shipment of cars ever made by an Indianapolis manufacturer to any foreign distributor was that which recently left the plant of the Cole Motor Car Co. It comprises 25 car loads of Aero-Eights, and is being sent to the Cole distributor in London, England, William Cole & Sons, Ltd.

CANADA'S PLACE IN AUTOMOBILE INDUSTRY.

Canada is now the second nation in the world in the manufacture of automobiles, number of cars owned and per capita distribution, the United States being first. Figures compiled by the farm bureau of the Goodyear Tire & Rubber Co., Akron, O., shows that one person in every 15 in the United States owns an automobile, while one in every 23 is the percentage in Canada. In Great Britain but one person in every 268 owns a car. The percentage in France is one to 102, one to 684 in Germany, one to 1000 in Italy, one to 2700 in Austria and one to 5300 in Russia.

The total number of cars registered in the Dominion of Canada is 350,000, as against 7,100,000 in the United States and 180,000 in England. Canada showed increased registration in 1919 of 13 per cent. Ontario was the banner province, with a registration of 127,860 passenger cars and 11,428 trucks. Saskatchewan, Alberta, Manitoba and Quebec rank in the order named.

Canada employs 15,000 workers in the automobile industry, which represents an investment of \$50,000,000. In 1919, 94,000 automobiles were made in the Dominion, with a total sales for the year of approximately \$100,000,000. The annual wages of persons in the industry totals \$15,000,000.



One of a Fleet of Rainier Trucks Equipped with Special Bodies That Will Be Used for Passenger Service in Jerusalem.

sent from New York City, where the headquarters of the Rainier Motor Corporation is located. These Rainier motor trucks are fitted with special omnibus bodies to accommodate 25 passengers. The Ramallah Co., which made the contract, will install a service from Jerusalem to Damascus in Syria. This company, which has offices in Jerusalem and also in New York City, states that there is a strong demand for improved transportation facilities in the ancient city. The English are planning to operate a fleet of trucks in that territory.

LIGHT CARS DEMANDED IN BURMA.

Two conditions favor the use of American cars in Burma in preference to those made in other countries: (1) Most of the purchasers are persons of moderate means who must buy a low priced car, and the taxi services also employ low priced cars; (2) the rough and hilly roads demand a car that is both light and durable. Burma has 1920 miles of metaled roads and 10,339 miles unsurfaced.

At present there are about 1725 passenger cars, 126 trucks, lorries and busses in Burmah. Most are of American origin.

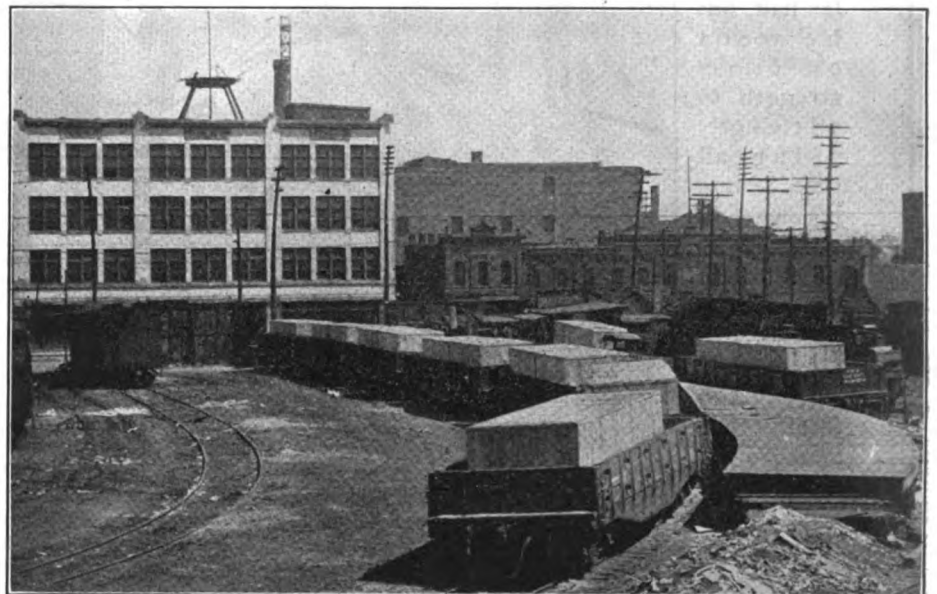
UP-TO-DATE GARAGE IN ALBANIA.

In Tirana, Albania a country almost without roads or means of transportation, there is a modern, up-to-date garage and repair shop—one which has repaid its owners, if not in coin, certainly in expediency, many times over. The shop can accommodate 10 cars at a time, the garage 25, while in the shop itself many of the tools are run by electricity, the current for which comes from the only

many of these shops in Albania. The mechanics are comprised of many nationalities, among them being Russian, Czecho-Slovakian, Austrian and Montenegrin, in addition to Americans. Without these little repair shops, the relief work of the Red Cross would never have progressed as speedily as it has in that section.

ARGENTINE MOTOR CLASSIFICATION.

The finance department of the Argentine Republic has authorized the customs department to classify as of declared value at 25 per cent. all electric motors for automobiles and apparatus for the generation of light and heat.



Twenty-Five Car Loads of Cole Aero Eights for Shipment to London Distributor.

The Successful Business Man Is the One Who Keeps Busy---But Not Too Busy

(By Lester G. Herbert, Auburn, N. Y.)

ACCORDING to Bruce Barton, in a recent issue of the American magazine, John D. Rockefeller used to keep watch for promising recruits in his business, and when he found one would seize the opportunity for a talk with him and would say:

"Now, the thing for you to do is to find someone to do your work as soon as possible. Then you put your feet on the desk and think up ways in which the Standard Oil Company can make more money."

None of us will deny that Mr. Rockefeller was a successful financier, or that he was slow in discovering brains to help him build up his fortune. It has been, in a measure, because he was so keen in discovering promising recruits that he gathered about him a great and powerful organization. We all know, and we have read again and again what a humble beginning John D. Rockefeller had, but he went on from strength to strength using all that came his way in a constructive manner.

But, do not be deceived and think that he simply set other folks to do things for

him, and that he had no further responsibilities in the piling up of the Rockefeller millions.

The truth of the matter is that this man, remarkable in many ways, kept busy himself—but not too busy. That is to say, he was thoroughly in touch with his business as he went along. It was his own thinking apparatus that devised the initial ways and means of making his business beginning. But he was shrewd enough to know that, if he worked industriously long hours throughout his producing years, his output would be, of necessity, limited. He would be a success, naturally, but no greater success than many others.

On the other hand, if he devoted himself to

three separate lines of endeavor, his prospects would be vastly enlarged, and the fortune he could build up would be colossal.

Perhaps this reasoning was not consciously done; nevertheless, it is the line of mental activity, practically followed by all great financiers, and for this reason is worthy of your earnest consideration and mine.

All too many of us are plodding along, succeeding in a moder-



"You Will Notice That All Our Big Financiers Have Organizations of Clever, and Thinking Men, but These Organizations Are Linked Up in a Close Union. Back of All Is the Master Mind; He Must Be the Real Governor Who Holds the Balance of Things Where It Ought to Be. Here Again Is Where the Business Head Or Principal Must Be Busy—But Not Too Busy."

ate way and supinely taking it for granted that we are doing as well as anyone could expect us to do, everything considered. Just the same there is such a thing as not making the most of the opportunity facing us.

The First Factor in Finance.

The first great factor in finance is the same whether you are operating a peanut stand at Pumpkin Junction, a big manufacturing plant turning out huge quantities of implements of all kinds, conducting a retail store, or serving as the president of a great banking institution. It is to know your line of business from A to Z; to understand all of the conditions affecting it; to organize your management in the most thorough going manner of which you are capable; and to exercise your will power to the end of keeping business at flood tide all the time.

Most people will gasp at the end of that black faced section and will say,

"Well, if a man does all that, he has done enough. He will be a success all right and he

under his care. It simply couldn't be done. So the business executive must not be too busy with details. He must keep a watchful eye out and, by keenly observing, to discover men and women who can be depended upon to help him make more money. He must make no mistakes in selecting these people and, to prevent mistakes, he must do a lot of observing, and weighing and measuring. He must have time to chat casually with these people, to get their viewpoints, to draw them out and to find what they can do. Having found them he must give them certain latitude under suitable and safe restrictions.

The Third and Important Consideration.

You will notice that all our big financiers have organizations of clever and thinking men, but these organizations are linked up in a close union. Frequent conferences are held; the business is so arranged that the balance of all sections or departments is carefully maintained, and back of all is the great master mind which does not permit anyone to ride a hobby horse to the

TO SUCCEED IN BUSINESS.

First: Know your business from A to Z; understand all the conditions affecting it; organize your management in the most thorough-going manner; and exercise your will power to the end of keeping business at flood tide.

Second: Summon to your side other men of ability and power. Be keenly observant, so as to make no mistake in selecting workers who can be absolutely depended on. Having found them, they must be given a certain latitude under suitable and safe restrictions.

Third: Arrange your business so that the balance of all its sections or departments is carefully maintained. Most important of all: Be yourself the Captain of the Ship, but do not try to be the whole crew, too. Encourage your crew to help you make more money by giving them the backing and guidance they should have. But keep your hand at the helm.

doesn't need to go any farther at all. He can do just that and keep busy!"

Yes, that is true—he will keep busy but, if he does not go on to the second principle I am about to outline, he will keep too busy. And there is such a thing as a man being buried in details. The individual who is buried never lives very long, even if he was not very dead in the beginning. Sooner or later he will smother and that will be the end of it all!

Remember, then, to keep busy doing the things which a wide-awake business man must see are done somehow or other—but do not keep too busy.

The Second Factor in Fortune Building.

The second principle is one all too seldom applied by the average man in business today, for the reason that he hasn't time or thinks he hasn't got it. It is just this: **The man who would succeed in any line in a big way must—absolutely must—summon to his side other men of ability and power. The governor of a state or the President of the United States would be utterly swamped trying to attend to all the departments**

of the business. Here again is where the business head or principal must be busy—but not too busy.

He must be the real governor which holds the balance of things where it ought to be and does not permit misguided judgment, over-enthusiasm or mistakes of others to swamp him. **He is the captain of the ship, but he has a finely disciplined crew of trained helpers.**

How about it in your business? Are you too busy? If you are it is a mistake. Are you trying to be crew and captain too? Or are you summoning to your aid the assistance of promising people and are you virtually encouraging them to make more money for you and giving them the backing and the guidance they should have?

Do you know that the errand boy, the junior clerks or older employees should all be making money for you—other than just by performing routine tasks. Encourage thought and honest effort intelligently used.

Keep busy but not too busy. You are the Captain of the Ship!

HUMOROUS SIDE OF MOTORING

KNOW SOMETHING WAS HAPPENING

A darky one day stood watching the proprietor of a well-known Cuyahoga Falls tire service station changing a set of tires on one of his usually busy days. The tire man came out of the army last spring and proceeded to show the folks how a real service station should be run. The negro, after seeing things fly for a few minutes, said: "Man, dat tire sure knows something is happening to 'er."

LOVE THY NEIGHBOR!

The chap next door who, when you retire, is out making wheezy and futile attempts to start his automobile, and, when you are trying next morning to make up the lost winks, is playing a lively record on his lawnmower, is the kind of neighbor who causes the Third Commandment to seem like a visionary and impractical idea.—Boston Globe.

POSITIVE PROOF.

"How did you contrive to convince your wife that you could not afford to own an automobile?"

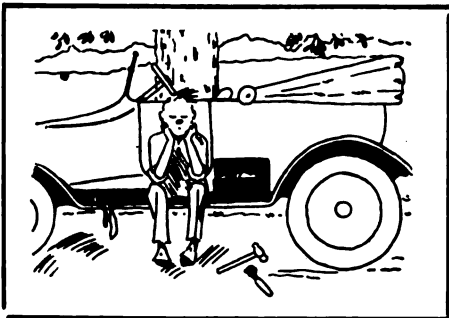
"Pure luck on my part. She wanted to clean an old dress and bought a gallon of gasoline."

HOW THOUGHTLESS.

Under the spreading chestnut tree a stubborn auto stands,
And Smith, an angry man is he, with trouble on his hands.
He cusses softly to himself, and crawls beneath the car,
And wonders why it didn't bust before he got so far.

The carburetor seems to be the cause of all his woe;
He tightens half a dozen bolts, but still it doesn't go.
And then he tries the throttle, but finds no trouble there,
Till, wet with perspiration, then he quits in sheer despair.

He squats beside the road to give his brain a chance to cool,
And ponders on his training at the correspondence school;
And then he starts the job once more, until by chance 'tis seen
The cause of all the trouble is—he's out of gasoline.



THE SOURCE OF THE COUNTRY'S UNREST.

On pests without number I've heard dissertations,
Harrangues short and lengthy—some seemed to me rich,
And during a time I have had some relations
With lobbyists, chesty chaps, blowhards and slich;
But herein the honors on one I'm bestowing,
A rooster who stands by himself in a class.
He's the long-winded artist who's all the time crowing
O'er mileage he gets from a gallon of gas.

He'd lead you to think at the wheel he's a wonder,
Alive and alert to his car's every whim;
And the doubter who questions his flabbergast thunder
Invariably finds his contentions are slim.



His knowledge of driving from A to Z reaches
(For slight observations he never lets pass).
O, there's tall talk unbanded whenever he preaches
On mileage he gets from a gallon of gas.

Avaunt all ye mortals with auto love gifted,
Skidoo to the rear or vamoose out the door,
For the one whom I sing has in second gear shifted
And's speeding it up—he possesses the floor.
An attempt to depose him is courting disaster.
He rules the surroundings, alack and alas!
You may try to ignore him—he'll talk all the faster
Of mileage he gets from a gallon of gas.

I can picture the culprit, devoid of credentials,
Appearing, "puffed up," at the heavenly gate,
Relating to Peter that such non-essentials
As sins he'd committed are trifling to

state;
I can hear him resort to his chosen diversion,
Expecting good Peter to hand him a pass;
But his finish I see when he makes the assertion,
"I came from the earth on a gallon of gas."
—J. J. Finnan, Naugatuck, Conn.

NEW NAME, OLD DISEASE.

Two girls were quarreling.
"O," said one, "I'm sick of you! I believe you can't help it, though. You've got a chauffeur's tongue!"
"What?" cried the other girl, scared.
"Is it catching? How does one get it?"
"O," said the other pointedly, "through constantly running people down."—Pittsburg Chronicle-Telegraph.

ALMOST TOO SUGGESTIVE.

The occupants of a jitney on their way to Providence one day recently were somewhat amused to note, on the front of a big truck that was lumbering along behind them, a big sign, evidently borrowed from some camp meeting or mission by the facetious, if not very reverent, driver, which bore the suggestive warning "Prepare to Meet Thy God."

LIKE A KIMONO.

He (in motor car): This lever here controls the brake. It is put on very quickly in case of an emergency.
She: I see, something like a kimono.

SOME MILEAGE.

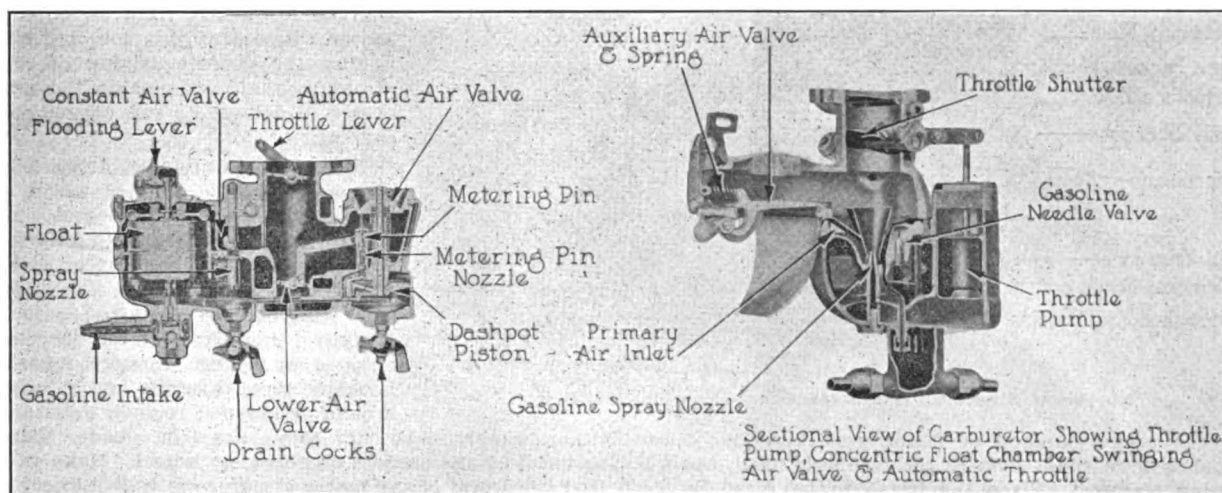
"How much did you get out of your car?"
"Well, I think seven times in one mile is my record."

HORN WAS ALL RIGHT.

Jones brought his car in a somewhat dilapidated condition to a garage to get an estimate on overhaul and repairs. The garage man (after finishing his inspection,) "Your horn is all right. Why not jack it up and put a new car under it?"



OVERHAULING THE AUTOMOBILE



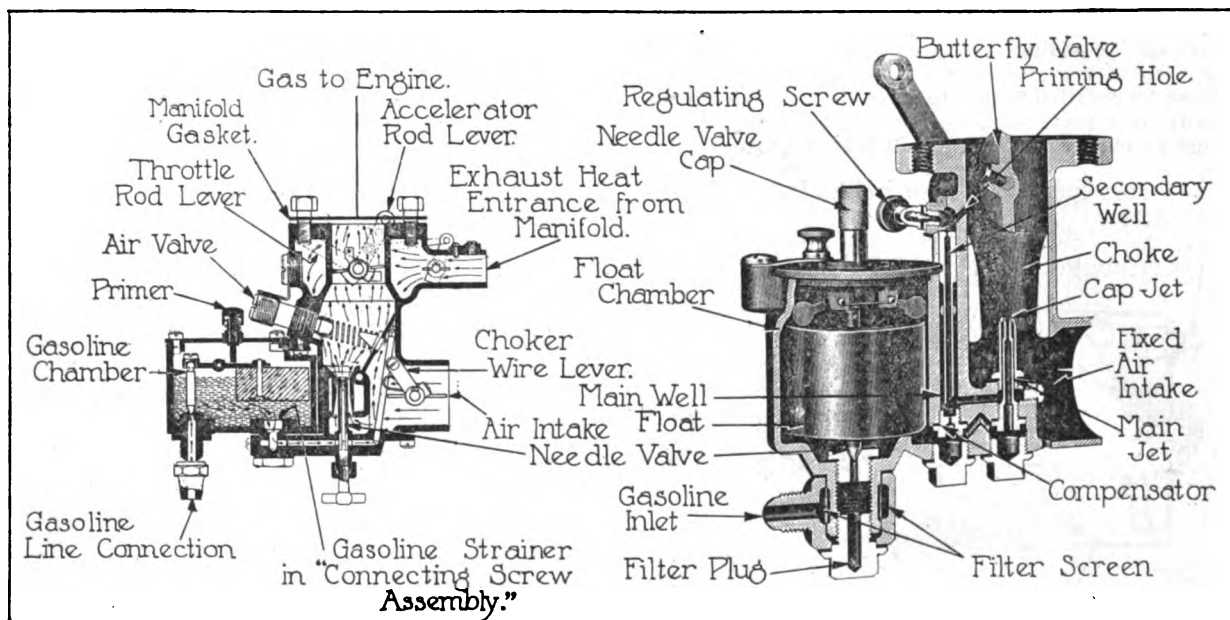
Typical Modern Carburetors: Rayfield at Left; Cadillac Eight-Cylinder Special Carburetor at Right.

(CONTINUED FROM MAY ISSUE.)

CONTINUING in regard to the generator and starting motor, after cleaning the commutator as outlined last month:

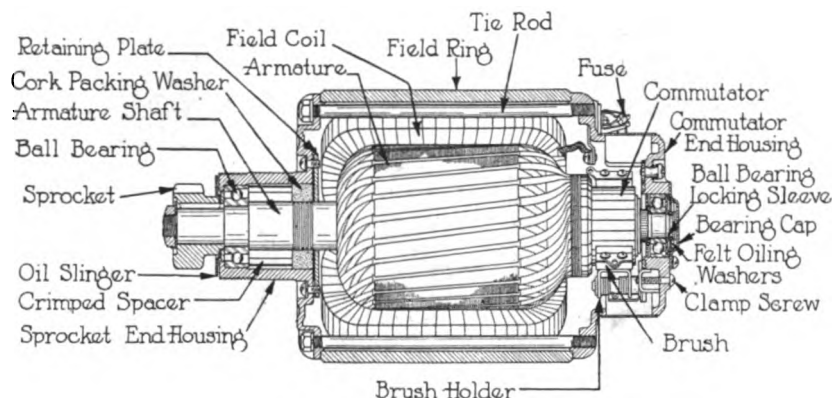
The armature, including the commutator, is then revolved and the surface of the commutator bearing against the sand paper surface is readily cleaned. This operation can be done to better advantage when the engine is running, as no effort is required on the part of the repairer to turn the armature and his attention can be fixed on the work of cleaning. The mica bars between the copper segments, after a period of operation, may become higher than the copper segments, causing the brushes to jump as they pass over them. This causes the current to fluctuate and gives an uneven output. To correct this defect, remove the generator from the engine, place it on the work bench or in a vise, and take off the armature from the generator frame. Most generators are provided with a separate frame that can be taken apart in three or more sections. Removing

these sections and the brushes allows the armature to be easily taken off. Place the end of the armature shaft in a vise to hold it steady and, with a piece of hack saw blade fastened in a wooden handle, cut the mica length ways between the copper segments, till it is below the top of the segments for a slight distance or about 1/32 inch. This will stop the chattering of the brushes and will also prevent arcing due to the jumping of the brushes. If the commutator segments are worn deeply, due to the action of the brushes bearing upon them, they should be trued in a lathe. Placing the armature in a lathe and cutting one or more turnings from the commutator will square the face to a point where it may be finished off smooth and brightened. When fitting new brushes to the commutator, care should be taken to have the brush fit square; that is, make sure that the point of contact fits the full width and depth of the brush. An imperfect fitting brush causes arcing at the point of contact and prevents the generator from delivering its full output of current.



Typical Modern Carburetors: Marvel at Left, Zenith at Right.

PROPER METHOD OF FITTING GENERATOR OR MOTOR BRUSHES.



Northeast Single Unit Starter and Generator, Model G.

The proper method of fitting generator or motor brushes is to sand them to the commutator in the following manner: Place the brush to be fitted in the brush holder. Cut a strip of No. 00 sand paper as wide as the commutator is long and pass it around the commutator with the sand side next to the brush; allow the brush to rest on the sanded surface and draw the sand paper back and forth with the fingers till the square end of the brush conforms to the oval surface of the commutator. Remove the brush and fit the second brush in the same manner, etc. The brush should fit the commutator for its full depth and width at the end. If it does not do this treat with the sand paper again till it does. The proper fitting of the brushes will insure a perfect working generator or motor when the job is finished, while on the other hand if they are carelessly fitted the results will be far from satisfactory.

While the generator or motor is disassembled, examine the bearings carefully. They are of the ball type and subject to breakage. If broken balls are found, supply new balls and if the cones or cups in which the balls fit are worn irregularly or chipped, they should be replaced. Examine the coupling at the front end of the armature of the generator at the point where it is driven from the pump shaft to note whether the coupling found at this point is worn. In certain generators an "Oldham" coupling is employed for this purpose and after a time wear of the friction surfaces make the coupling inoperative failing to drive the generator to its capacity, and preventing the storage battery from receiving its charge, with the result that the battery soon

becomes exhausted and has to be re-charged frequently from an outside source. Renewing this coupling will restore the correct driving of the armature shaft and enable the generator to deliver its full capacity of current.

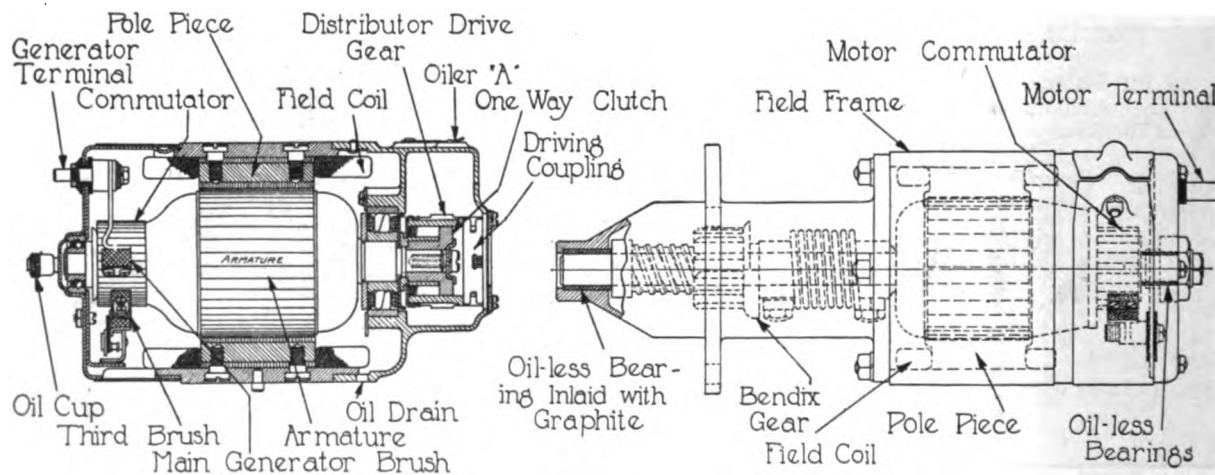
Examine the Bendix drive gear connection to the balance wheel of the starting motor. This operates on a worm and is provided with a spring which forces the gear out of mesh with the balance wheel ring gear, after the engine is started. Occasionally the gear teeth become chipped or broken through misuse. Examine them carefully and if found broken or chipped remove them and

either supply new if they are in bad shape or bevel off the corners on an emery wheel. Make sure that the worm of the motor armature is well lubricated and that the gear works freely on the worm. Failure of the gear to move freely will cause trouble when the operator attempts to start the engine from the battery by means of the starting pedal.

When assembling the generator or motor, make sure that the parts are in their proper place and that all screws are tightened securely, supplying lock washers where necessary. Put a few drops of oil into the small openings of the tubes that pass the oil to the bearings, using a high grade of sewing machine or Three-in-One oil. These bearings require lubrication about once every 1000 miles of travel and the best of light oil should be used.

Clutch Cone Type.

After having reassembled the engine and its parts, making sure that all bolts and nuts are tight, and all parts subject to wear and friction supplied with lubricant, the next component to receive attention is the clutch. In many engines the clutch and gearset are a unit with the base of the engine and enclosed in an oil tight housing to prevent the lubricant from working out, or dust working into the case. Other manufacturers do not employ this construction, preferring to construct the clutch and gearset as separate units and distinct from the engine base. This construction was employed more extensively in cars of earlier models and is not so common in later models. Where the unit type of construction is used it will be necessary if any amount of work is to be done to the clutch unit, to dis-



Remy Two-Unit Generator and Starting Motor.

CARE OF THE CLUTCH, BOTH CONE AND MULTIPLE-DISC TYPES.

connect the bell housing from the engine case, thus giving the repairer ready access to the clutch member. Loosening and removing the machine screws around the bell housing and disconnecting the clutch pedal from the clutch pull out collar will enable the repairer to remove the bell housing and the gearset as a unit from the engine case. The clutch can be taken from the flywheel for relining if of the cone type, by loosening and removing the bolts that hold the clutch spring housing to the hub of the clutch spider. Take out the cotter pin in the end of the crankshaft extension and also the hexagon nut that holds the cone of the ball bearing in place and the spring can then be slipped from the shaft, allowing the clutch spider to be removed from the cone of the flywheel and crankshaft.

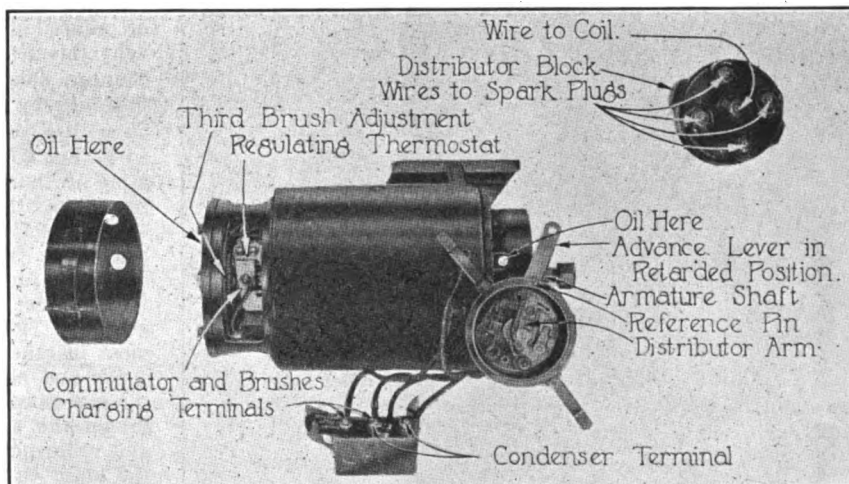
If the clutch spider does not require a new lining the necessary operations can be performed without disassembling by working through the square opening on the top of the housing. Such repairs as a slipping or grabbing clutch are easily remedied by washing off the surface with kerosene and treating the leather face with neats foot oil if the clutch grabs, or with Fullers earth ground fine if the clutch slips. The leather should be kept in a soft and pliable condition and not allowed to dry out. Relieving springs are usually provided in the rim of the clutch spider to take up wear of the leather facing so that adjustments of the clutch leather due to wear is usually unnecessary.

Multiple-Disc Type.

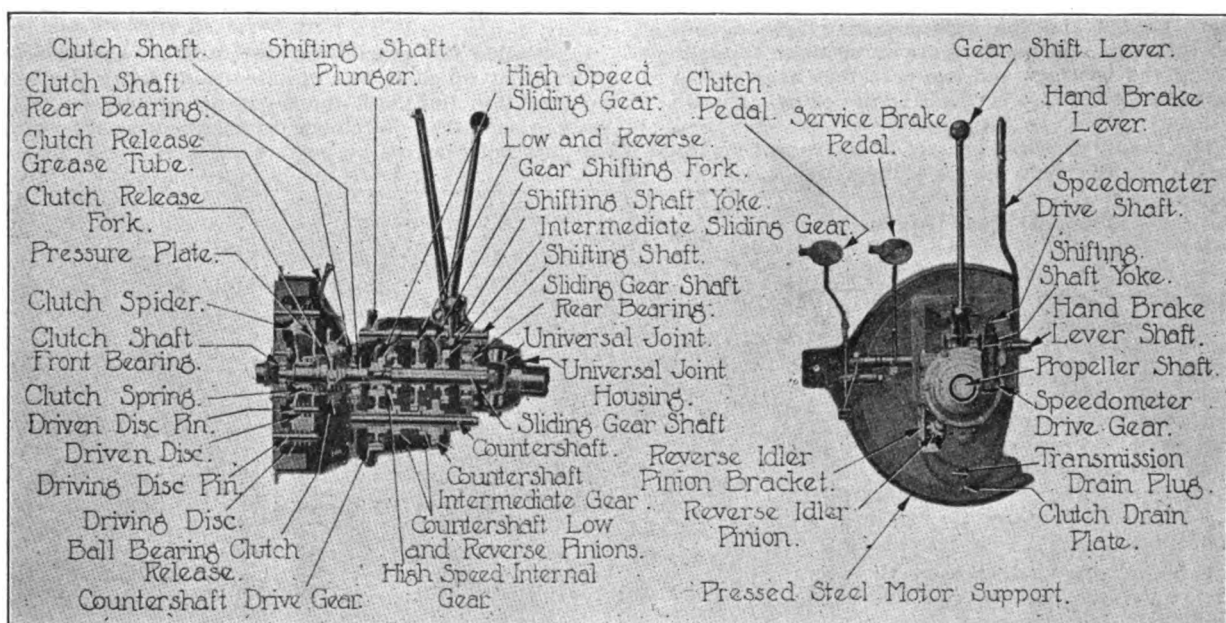
The disc clutch, on the other hand, consists of several plates placed alternately, a smaller disc made of steel being located between a larger disc covered on both sides with asbestos, the discs being held in posi-

tion by bolts passing through them. Tension is provided by springs on the bolts adjusted to the proper tension. Oil is injurious to the asbestos facing of multiple disc type clutches and should not be allowed to come in contact with them. In case of a slipping multiple disc clutch, adjustment of the nuts in the rear of the springs will cause the discs to press closer together and to hold more firmly. In case of a grabbing clutch, which is very rare, loosening the nuts will allow the discs to separate freely.

In case it becomes necessary to fit new discs, the old ones are readily removed by loosening and taking off the bell housing as for the cone clutch if the unit type of construction is used, or by disconnecting the universal joint between the clutch and gearset if of the type where the gearset is placed amidship. After the bell housing is loosened it may be removed together with the gearset, allowing free access to the clutch. The discs are held in place by three long bolts passing through their edges and positioned in the clutch spider.

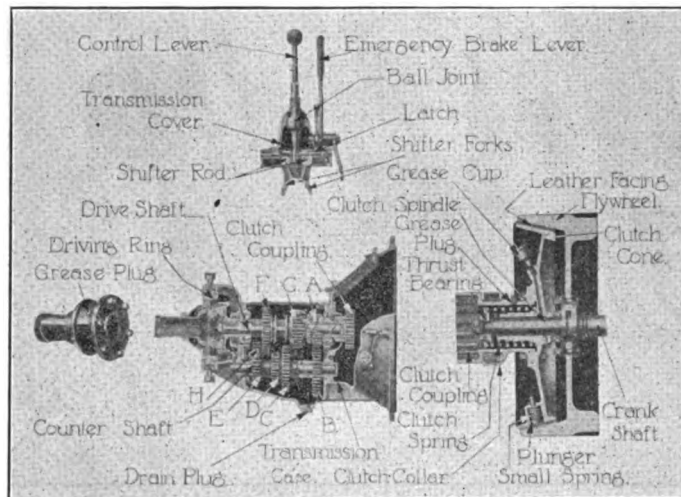


Remy Generator, Distributor, Condenser and Regulating Thermostat.



Modern Unit Construction, Multiple-Disc Clutch and Gearset, Showing Location of Pedals, Gearshift, Emergency Brake Levers.

CONDITION OF THE GEARSET.



Unit Construction, Leather-Faced Cone Clutch, Gearset, Universal Joint and Gearshift Lever.

Loosening and taking off the nuts and washers on these three bolts allows the removal of the discs without disturbing the clutch spider. One type of disc clutch that has the gearset located amidship has the flywheel unenclosed, but with the clutch included in the face of the flywheel. To remove the discs from this type it is necessary to first compress the three clutch closing springs located at equal distances around the clutch housing, then to take out the pins and caps from the ends of the rods, allowing the cap and springs to be removed. Next disconnect the universal joint between clutch and gearset at the rear of the clutch housing. Take off this short shaft and the clutch housing can be removed. Access can now be had to the clutch discs and these can be taken out if replacement is necessary, by loosening and pulling out the six nuts on the side of the flywheel next to the engine, allowing the removal of the clutch plate disc assembly.

Care must be taken when reassembling the clutch to have all bolts and nuts tight, the cotter pins placed where needed and the nuts requiring wire fastening, tied with wire and the wire drawn up tight. Supply oil only at the bearings and use care that none comes in contact with the disc surfaces of the clutch.

Gearset.

The condition of the gearset is determined by draining the old oil from the case and washing out with kerosene to remove the sediment. Remove the cover, including the gear shift lever and the emergency brake lever after disconnecting the linkage that operates the brakes. Examine the gears critically for burred, stripped or badly worn teeth. All gears the teeth of which are worn badly or to a thin edge should be replaced with new. Teeth that are burred can be repaired by grinding off the corners to a bevel, while gears that have broken teeth should be replaced.

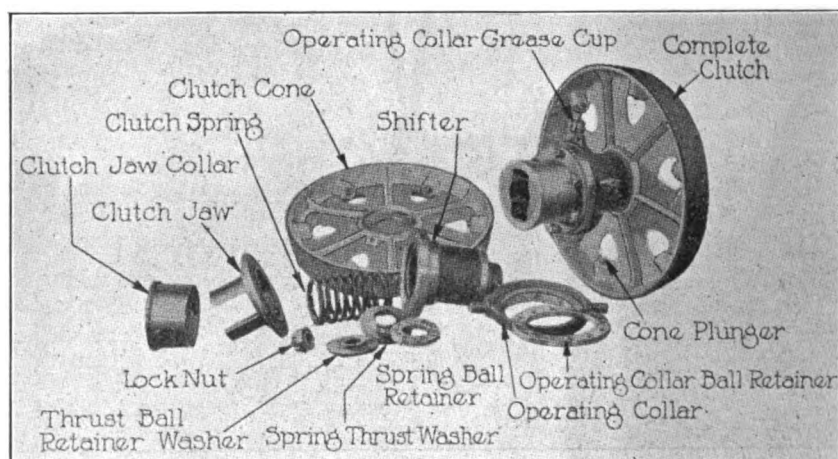
Examine the bearings at the outside of the gearset and note whether grease has been working through and shows on the outside of the case. If it has the stuffing

or adjusting nuts will need tightening to prevent this grease passing. Test the main and counter shafts for wear in the bearings and bushings by lifting the shaft by hand or prying up with a light steel bar. Lift the shaft easily so as not to strain it. This will usually determine if there is any play in the shaft and if found that the bearings need adjusting, take up the lost motion. Do not adjust too tightly or the bearing is liable to overheat. The main shaft can be withdrawn by removing the universal joint connections at the front and rear of the gearset. These joints are keyed to the shaft in most instances and in others are fastened with a nut and key, a cotter pin being used to keep the nut from turning. After the joints are withdrawn the bearing adjusting nuts are loosened and removed and also the bearings. Withdraw the main shaft from the case, sliding the main shaft gears off the splined shaft as it is pulled out. The countershaft is removed by loosening the adjusting nut and washer at the end of the shaft, allowing shaft to be slipped forward into

opening and the opposite end lifted up and out of the case. To separate the gears it will be necessary to use a gear puller, as the gears are keyed to the countershaft. In replacing with new gears be sure to get them positioned correctly on the shaft and firm on the keys. Replacing the shaft in the case is the reverse operation to disassembling and care should be taken to seat the ends firmly in the bearings and have the bearings adjusted correctly. Fitting the main shaft is also the reverse of disassembling, using care to position the gears correctly on the splines as the shaft is inserted in the case. Adjust the bearings so that the shaft moves freely and without play. Set the locking nut into the adjusting collar after the adjustment is made to prevent the collar from moving when the car is again in use.

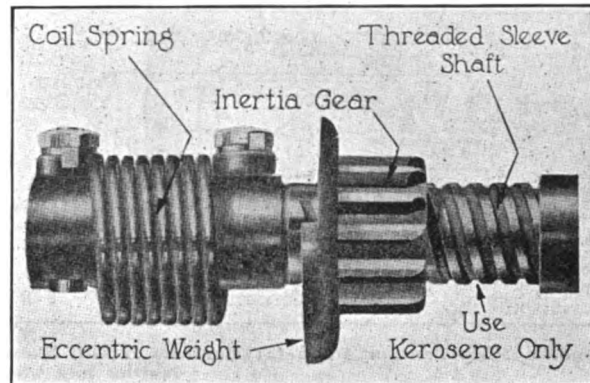
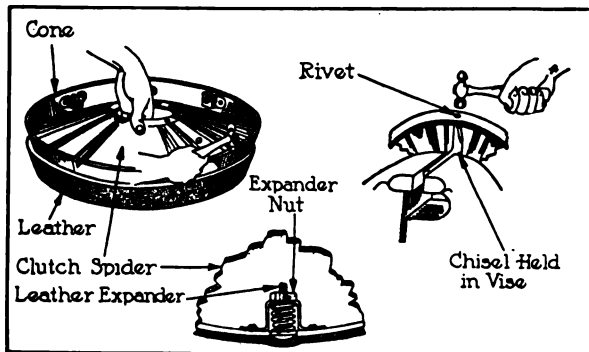
Assemble the cover and levers on the opening to the gearset, locating the shifter forks in the collars of the proper gears, supplying lubricant to the collars. Fit a new gasket to the cover if necessary, setting the cover in place and tightening down with the cover bolts securely.

Assemble the gearset to the clutch in the reverse order from which it was disassembled, fitting the bell housing into line with the holes in the engine case, making sure that the clutch driving gear meshes with the internal gear of the gearset shaft and drawing up



Cone Clutch Disassembled, Illustrating Parts of Clutch.

PLACING POWER PLANT IN CHASSIS.



Left, Replacing Worn Clutch Leather, Showing Correct Method of Fitting; Right, Bendix Drive Used on Starting Motor, Meshing with Driving Ring on Balance Wheel.

tightly the bolts of the housing and engine case. Connect the clutch pedal to the clutch collar and make other connections that are necessary to complete the power plant assembly.

Placing Power Plant in Chassis.

The power plant is now ready to be placed in the chassis. With the engine on the engine stand, raise it with the chain falls, and run the car chassis underneath the falls and lower the power plant into the chassis, fitting the engine arm bolts to the holes in the frame before the chain falls are removed. Lower the engine entirely into the chassis, push the bolts into place and tighten. Replace the gearset cover and levers, setting the bolts up tight after supplying lubricant to the gearset. Use steam cylinder oil for this purpose instead of grease, and fill the case to within one inch of the main shaft.

Fill the engine oil reservoir with engine oil through the breather tube till the indicator on the reservoir shows that the tank is full, then add at least one quart more if the engine is of small size and two quarts if the engine is larger. This extra oil is for the benefit of the tightened bearings, which should receive plenty of lubrication for a time after the engine is first started to prevent the bearings from seizing, and to insure that they are properly limbered up.

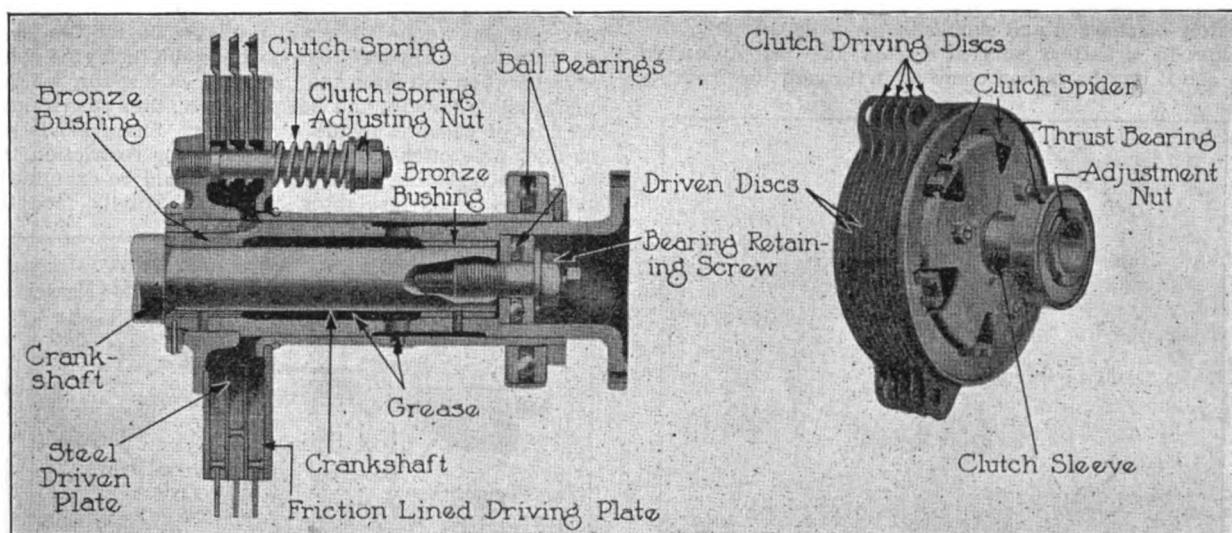
Connect the wires to the units and the spark plugs,

consulting the tags which were attached to the wires when the engine was removed from the chassis. If in doubt as to the proper connections to make, study the wiring diagram in the instruction book which came with the car, which will show plainly where each wire is connected to the engine and to what other electrical unit it is attached.

Storage Battery and Wiring.

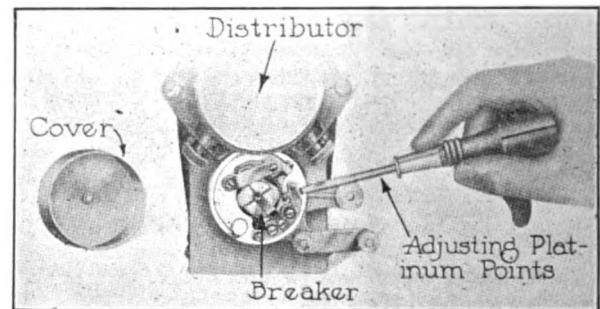
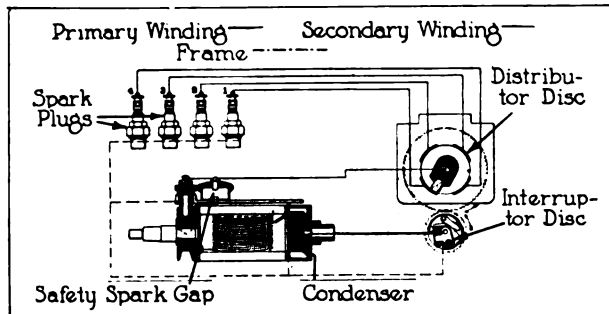
In a car that has been standing in storage for some time the storage battery will naturally have become weakened. Many motorists make it a practise to remove the battery from the car when it is placed in storage, sometimes sending it to a battery station, where it receives a charge at stated periods, the electrolyte tested frequently and the battery cells kept filled with distilled water. Still other motorists store the battery in the house cellar, charging it frequently from the house lighting circuit, using a small rectifier. While still others leave the battery in the car during the time of storage and should not be surprised to find it exhausted.

If the battery has been at a service station where it has received proper attention, all that is required is to place it in the battery box and connect to the generator, brightening the connecting terminals with sand paper and coating them with vaseline. On the other hand, if the battery has been left in the car its condi-



Modern Multiple-Disc Clutch Construction; Saxon at Left, Reo at Right.

FUEL PIPES NEED CLEANING.

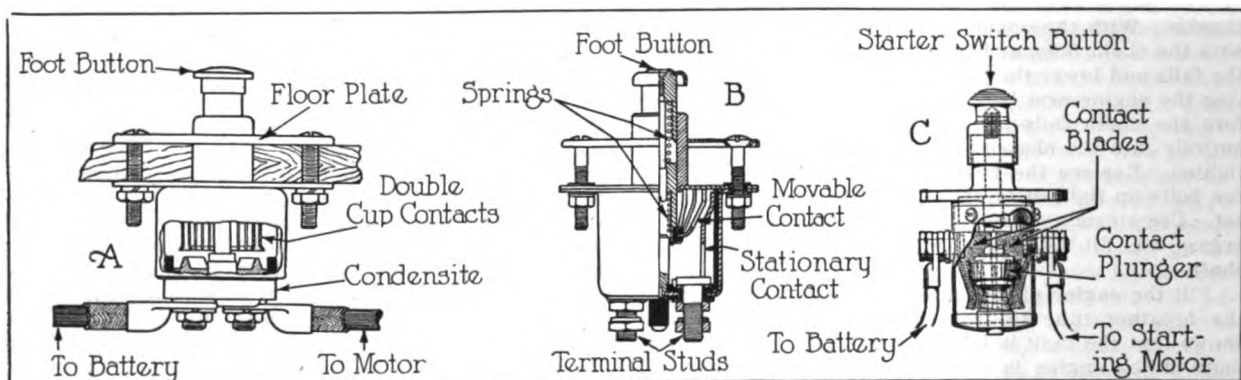


Modern High-Tension Magneto; Diagram at Left Shows Location of Condenser, Safety Spark Gap, Etc.; Right, Adjusting and Cleaning Breaker Points.

tion can be determined by testing with a hydrometer.

Remove the rubber stoppers in the center of each cell, which are removed when distilled water is added. Insert the rubber tube of the hydrometer into the electrolyte and compress the bulb at the top; releasing the bulb allows the electrolyte to enter the glass tube and raise the small float. The float is weighted at the bottom with fine shot to keep it in an upright position,

of the liquid, possibly damaging the jars of the cells. If the battery, after testing, is found to be undamaged, it can be recharged. The battery expert will be able to tell how long it will hold its charge and whether the battery is in good condition or not. It should not be necessary for the owner repairer to add acid to the battery, as this should only be done by the expert and then under conditions that demand it. All that the



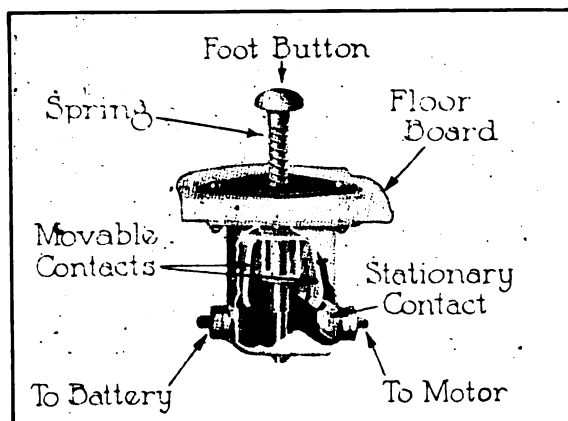
Modern Starting Motor Switches: A, B and C Illustrate Three Types in Use in Modern Cars, Showing Components.

while the side is graduated and is marked 1150, 1200, 1250, 1300 and 1350. If the float sinks into the electrolyte to a point between 1250 and 1300 the battery is fully charged and should start the engine. If the reading is below 1250 and near 1150, the battery is completely discharged and should be removed from the car, taken to a battery service station and tested further to see if any harm has come to it through the freezing

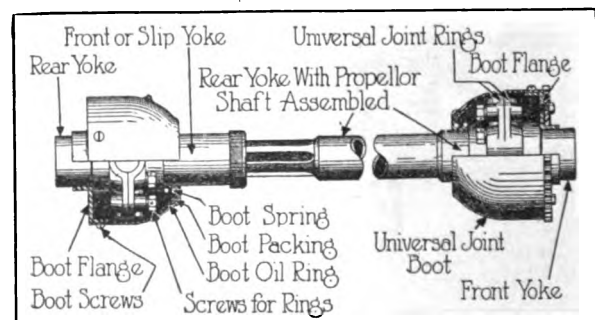
owner will ever be called upon to add to the batteries is distilled water and that at periods stipulated by the manufacturer.

Fuel Pipes Need Cleaning.

It is good practise to clean the fuel pipes at this time and once done they will probably do for the season. There are several points, where the feed pipe connects between the main tank and the carburetor, where it is possible for dirt and lint to gather, thus restricting the flow of gasoline to the carburetor. Sharp bends in the fuel pipe offer a favorable point for restriction to the flow of gasoline. The pipe line should be examined and these bends straightened. When gravity feed is



Type of Starting Motor Switch Using Movable Contacts at the Side in Making Connection.



Universal Joints and Propeller Shaft Illustrated, Showing the Principal Parts.

WIRING OF CAR SHOULD BE EXAMINED.

used and the tank is located under the seat the sediment in the tank well can be removed by opening the petcock underneath, running a wire up through the opening, dislodging the sediment and allowing it to drain out through the petcock into a container. Straining again through chamols will remove the sediment so that the gasoline can be used again.

In case the car is equipped with a vacuum tank and the gasoline is carried in a main tank at the rear of the car, the pin hole in the cover should be pricked open to make sure that it is clean. The strainer on top of the vacuum tank should be removed at the point where the pipe is fastened to the tank and cleaned.

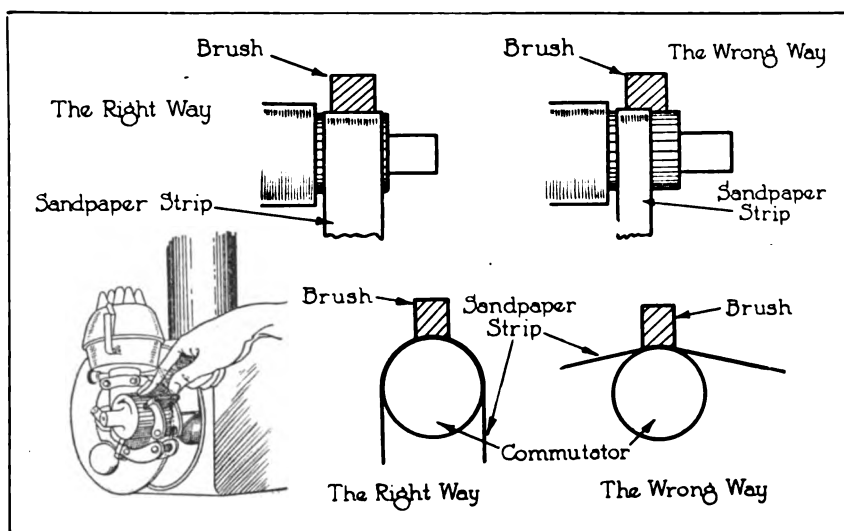
On many engines there is also a strainer provided at the carburetor at the point where the gasoline enters the bowl of the float chamber. Unscrewing the connection and removing the pipe will expose the strainer, and it may be lifted out and cleaned.

Many cars have a strainer fitted in the main tank at the bottom of the feed pipe, and this can usually be reached through the drain out plug under the tank.

In case of stoppage of the flow of gasoline and the cleaning of the strainers does not remove the obstruction, it is certain that the trouble is in the fuel pipe between the connections or the main and vacuum tanks. Any obstruction can be removed by disconnecting both ends of the pipe and forcing air through.

Examine Wiring of Car.

Examine the wiring of the ignition, lighting and starting circuits, noting whether or not the wires that are not placed in conduits are bearing against the metal surfaces of the car or the insulation is frayed allowing the current to short circuit back to its source without performing its work. If the wires are frayed or the insulation is broken in many places, the proper course



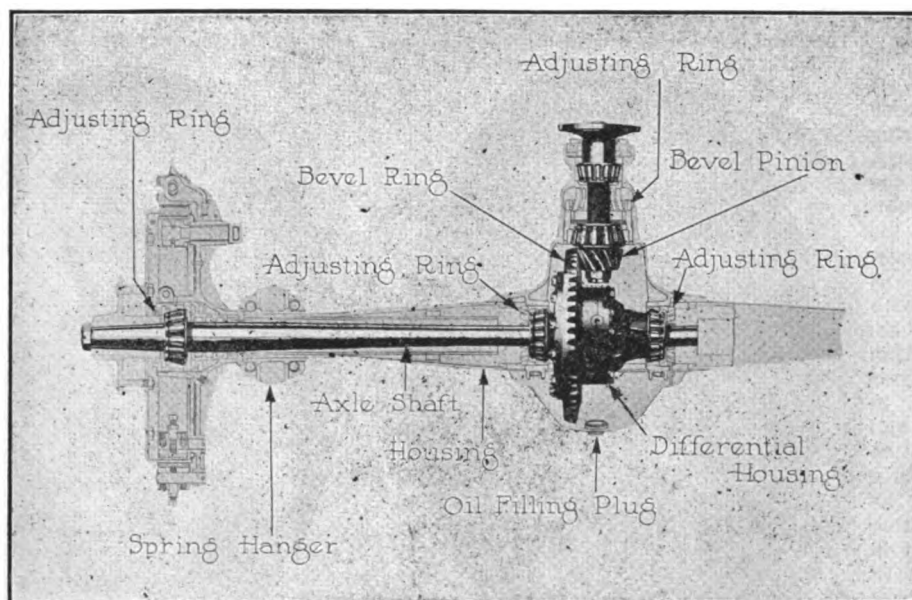
Methods, Correct and Incorrect, Used in Sandpapering Commutator and Fitting Brushes.

to pursue is to replace the wire with new. Wires that are placed in conduits seldom become short circuited or oil soaked, as they are enclosed in flexible metal tubing that prevents them from chafing and the oil from entering. The points where trouble can occur in a conduit wired system is at the junction boxes where the wires are connected in from other electrical units, at the switch located in the dash or cowl where loose connections can occur, at the fuse block where loose connections may be found, at the current regulator in the connections and the electrical units themselves where the wires are attached. Loose connections will cause resistance to flow of current and will weaken the flow to such an extent that the parts will be prevented from performing their work properly.

Examine all connections carefully and if any are found loose, make sure that they are tightened. The high-tension wires leading to the plugs are fitted with copper ends; these are soldered to the wire and many times will be found insecurely fastened. If found loose or unsoldered, resolder, making an all-metal path for the high-tension current to follow.

When connections are made at junction boxes the joints should be soldered and taped with adhesive tape to prevent the wires from short circuiting. This applies to lamp wires that have become broken, have been lengthened or new sections of wire fitted; all wire connections should be soldered and taped unless the connection is made with a screw and washer or other form of metal connector.

(To be continued in July issue. Copies containing these discussions should be retained, as all the installments will form a complete overhaul review.)



Modern Three-Quarter Floating Axle Showing the Components.

Personal News of the Industry in Brief



B. G. Koether, Vice President and Assistant General Manager Roller Bearing Co.

B. G. Koether, after 18 years of service with the Hyatt Roller Bearing Co., Detroit, Mich., has been made vice president and assistant general manager of the Hyatt division of the General Motors Corporation. He has relinquished his duties as director of sales and advertising, and will devote his entire efforts to boosting Hyatt production to meet the greatly increased demand. This work will keep him at the company's plant at Harrison, N. J., where he has made his headquarters since leaving Detroit. Mr. Koether entered the employ of the Hyatt Co. as an accountant, and successively held the positions of purchasing agent, assistant sales manager, sales manager and head of the motor bearings division. He is a member of the Detroit Automobile club, the Detroit board of commerce and the Detroit section of the Society of Automotive Engineers.

Horace A. Brown, Jr., who has been identified with the Hyatt Roller Bearing Co., Detroit, Mich., for the past 19 years, has been promoted to be manager of the Motor Bearings division, with headquarters at Detroit. Mr. Brown received his technical education at Stevens institute, and began his professional career as draftsman and assistant engineer with the Atlas Portland Cement Co., later becoming assistant engineer of an Edison power station. He joined the Hyatt Roller Bearing Co. at Harrison, N. J., in 1901, as assistant to the secretary and sales manager, and with the exception of about a year and a half spent with a prominent high-speed tool company, he has been with the Hyatt organization ever since. He first went to Detroit in 1909 and became chief assistant to B. G. Koether in 1911 and has held successively the positions of senior sales engineer, manager of the sales department and sales manager, from which position he has just been promoted. He is a



Horace A. Brown, Jr., Manager Motor Bearings Division, Hyatt Bearing Co.

member of the Detroit Athletic club, Detroit Board of Commerce, Detroit Automobile club, Society of Automotive Engineers, and is also a member of the Masonic bodies of New Jersey.

William Krafve is the designer and production manager of the Capitol motor truck, made by the Capitol Motors Corporation, Fall River, Mass., and exhibited for the first time at the Boston show. Mr. Krafve is a native of Sweden, but came to this country when he was four years of age. He has been associated with the automotive industry for the past 21 years, being at different times and in various capacities connected with the Cadillac, Buick, Regal, Koehler, Republic and Ohio Motor car concerns.

W. A. Woods, vice president of the Van Cortlandt Vehicle Corporation, metropolitan distributor for Peerless

eight-cylinder motor cars, has been elected by the National Automobile Dealers' association as director of the eastern district. Mr. Woods was also elected a member of the executive committee of the association, consisting of three members, to represent the grand eastern division, which includes New York, Pennsylvania, New Jersey, Maryland, Delaware and the New England states. A still further honor accorded Mr. Woods was his recent election as vice president of the Automobile Dealers' association of New York City.

J. A. Wilson is general sales manager of the recently organized firm of Davis, Newland & Wilson, Inc., car dealers at Buffalo, N. Y., and is confining his attention to the sale of the American Six.

H. R. Bernhart has entered the automobile business in Buffalo, N. Y., as treasurer of the Van Dusen Motor Sales Co., 1241 Main street, distributor of the Moon and Elgin lines.

Clayton H. Meyer, secretary and advertising manager of the Meyer Motor Car Co., which distributes the Peerless and Reo motor cars at Buffalo, N. Y., states that his concern will soon build an addition.

Theodore S. Clark, who has been connected with the Franklin car agency at Buffalo, N. Y., for some time, has just been made vice president of the Ostendorf Co., the Franklin distributing concern in that city.

Ralph Keller, vice president of the H. E. Lesan Advertising Agency, New York City and Chicago, on and after July 1, 1920, is to handle all the publicity of the Apperson Brothers Automobile Co., Kokomo, Ind.

Joe Dawson, winner of the 500-mile speedway race at Indianapolis, Ind., in 1912, and world's record holder for the 24-hour mark, is now connected with Walter Scott, distributor of Marmon cars, at Baltimore, Md.



W. A. Woods, Vice President, Van Cortlandt Vehicle Corporation.



William Krafve, Designer and Production Manager, Capitol Motor Truck Co.

Thompson Manager of F-W-D Co.

J. H. Thompson, a veteran in the automobile industry, has been appointed manager of the recently established factory branch at New York City of the Four Wheel Drive Auto Co., Clintonville, Wis., maker of FWD trucks. This new branch covers a territory from Baltimore, Md., to New England. Mr. Thompson started in the automobile business with the Babcock Electric Carriage Co., Buffalo, N. Y., where he was for a number of years manager and territorial agent. He was later connected with the sales organization of the General Motors Co. and the Mercury Manufacturing Co.

P. B. Williams, general sales manager of the Mac-Lar Battery Co., has resigned to accept the presidency of the Barco Battery Co., maker of the Bearcat storage battery for automobile starting and lighting. Mr. Williams has been in the battery business for over 10 years and is well known to automobile and accessory dealers throughout the country.

R. L. Armstrong has been appointed manager of the Omaha, Neb., branch of the Pennsylvania Rubber Co., Jeannette, Pa., to succeed Dan McAvoy, resigned. Mr. Armstrong has represented the Pennsylvania company for the past year, working out of the Kansas City, Mo., branch.

V. F. Languille and D. C. Sailey have purchased the Chevrolet agency on North 26th street, Tacoma, Wash., and will operate it under the firm name of Sailey & Languille, Inc. Parts for Ford and Chevrolet cars will be carried, as well as a line of accessories.

W. J. McIntyre, special factory sales representative of the Splittorf Electrical Co., formerly located at Cleveland, O., is now making his headquarters at the Newark factory. He will continue to handle the same territory in Ohio and Indiana as formerly.



H. G. Edwards, Southeastern District Manager, Acason Motor Truck Co.

Edwin C. McGraw, founder and president of the McGraw Tire & Rubber Co., recently died at his home in Miami, Fla., aged 61 years. He was also president of the Fidelity Trust & Mortgage Co. and a director of the Fidelity Bank & Trust Co. of Miami.

Lee Hammond has organized the Hammond Tire Co., Spokane, Wash., and will handle Goodrich cord and fabric tires and tubes, together with a complete line of tire accessories, at W 922 First avenue.

Edward K. Roberts, for several years with the Bush Manufacturing Co., Hartford, has been made general sales manager of the Stewart Motor Corporation, Buffalo, N. Y., to succeed Charles C. Craig.

J. C. Lusk, manager of the Motor Inn Garage, Oklahoma City, Okla., is to represent the Stewart motor truck in that district.

Harry Hansen of Chicago has bought the garage of V. D. Millison at Ismay, Mont.



C. D. Fleming, Treasurer, Cleveland Tractor Co., Cleveland, O.

Fleming Treasurer of Cleveland Tractor

C. D. Fleming, formerly of Detroit, Mich., has been appointed treasurer of the Cleveland Tractor Co., Cleveland, O., in charge of finance and accounting. Early in his business career he was recognized as one of the leading public accountants of Detroit, which profession he followed for several years. He later became associated with the Detroit Trust Co. in this line of work. Some seven years ago he became affiliated with the Studebaker Corporation as assistant treasurer and had charge of the accounting and costs departments of the plants of that company at Detroit until his present connection with the Cleveland Tractor Co.

E. Hunn, Jr., formerly service manager of the service station of the Packard Motor Car Co. of Long Island City, N. Y., has been made service manager of Hare's Motors of New England, with headquarters at Boston.

W. T. Bosworth, formerly with the automobile department of N. Snellenburg & Co., has been appointed manager of the Philadelphia branch of the United Tire & Rubber Corporation, 624 Arch street.

Thomas Barrows, Jr., manager of the truck tire department of the United States Tire Co., Philadelphia, has been appointed manager, in the Philadelphia district, of the Gillette Tire Co.

R. H. Patterson, who has been assistant wholesale manager of the Overland Automobile Co., St. Louis, for the past three years, has been made district manager for Quincy.

A. T. Lowry has been chosen manager of the Fort Worth Automobile Trades association. He was formerly secretary of the Citizens' Hotel Co., going to Fort Worth from Chicago two years ago.

Ernest Farr is chief of the ship-by-truck bureau of the Firestone Tire & Rubber Co. at Akron, O., with its 65 branch bureaus all over the country.



J. B. Adair, Branch Manager, J. I. Case Plow Works Co.



J. H. Thompson, Manager of the F-W-D Factory Branch at New York City.

Analogy Between Parts of Automobile and Organs of Human Body

THE carburetor of the automobile has been referred to as the lungs of the car. After a few moments thought the aptness of this will be apparent for, without some device through which the engine can take in a mixture of raw gasoline and a correct proportion of air it would be difficult to operate the modern gasoline engine successfully.

Just as the carburetor may be considered the lungs of the automobile, so the electrical units and their wiring connections constitute the nerves. There are motor nerves to supply the starting motor from the battery which, to carry out the analogy to the human body, might be called the brain. Other nerves convey "pep" and power to the cylinders, and still others operate the lamps, horn

has a wiring diagram and other data.

Electricity Compared to Water.

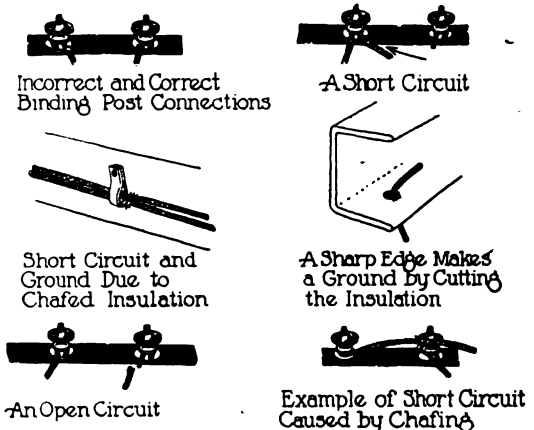
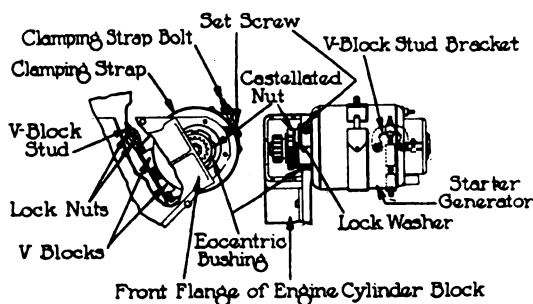
It long has been the practise to compare electricity to water in explaining its action, and this analogy may be carried out in the case of the car's electrical system.

First, the tank for storing water compares with the storage battery of the car, in which it may be assumed that electricity is stored. From the tank may extend a pipe, equipped with a valve, connected to a water motor. If the valve is opened the water turns the motor and if this be connected to machinery it will be operated. Likewise in the electric system a wire may be run from the battery through a switch (valve) to an electric motor. Closing the switch sets the

tery, allowing the current to pass through switches to the devices. In practise one wire runs to the switch and branches are extended from that point, just as in the water system a main pipe is provided with spur pipes to the several outlets. In the automobile the switch box contains the terminals of all the wires for the entire electrical system except those of the starter, which run to the starter pedal or button.

The Ampere Meter.

If it is desired in a water system to know how much water is being pumped and the pressure, a suitable meter is installed. In the automobile the ammeter shows the amount of current passing through it and the voltmeter indicates the voltage or pressure of the current.



Left, Modern Chain Driven Generator; Right, Showing Correct and Incorrect Binding Post Connections and Possible Locations of Short and Open Circuits.

and other electrical devices. Each of the wires and devices may have disorders similar to the nervous afflictions of the human species.

Electricity as Applied to Car Difficult to Understand.

The electrical side of the automobile seems to be the hardest for most motorists and many repairers to understand. Many otherwise good automobile repairers "fall down" when electrical troubles develop. Originally there was only a battery to furnish ignition current, with a vibrating coil to produce a high voltage. Lamps were of acetylene gas or oil and the starter was of the manual variety. The electrical outfit was exceedingly simple and would hardly bewilder the veriest novice.

Then came the demand for electric lights, electric starter and other electrical devices, calling for a storage battery and a multiplicity of wires and meters with regulator and cut-out and complicated switches. Now it takes quite an electrician to care for this part of the car, but one may learn by study. As usual a start may be made with the manufacturer's instruction book, which

electric current flowing, turns over the motor and, if it be geared to a gasoline engine, it will revolve the crankshaft. This is popularly called a self-starter; really it is an electric cranker.

If the water motor were thus connected to a gas engine to start it, and the engine operated as a pump, it would pump water back into the tank. In the automobile the engine, when started, operates an electric generator—"electricity pump"—which replenishes the storage battery. Within limits this is a self-contained system.

To prevent too much water going to the tank and overflowing it, a float might be arranged so as to close the valve at a certain level. In the electric system a current regulator usually is installed to prevent overcharging the battery.

It might be desirable to conduct the water from the tank to the wash stand, bath room, sink or elsewhere, which is done very easily by spur pipes, each equipped with a valve or faucet at the point where the water is to be used. In the automobile when current is desired for the lights, ignition, horn and other devices, wires are attached to the bat-

In the electric system there must be a complete circuit in order for the current to flow. If there is a wire to any device from the battery, there must be a wire or other conductor leading back to the battery again. The necessity for the return circuit is not so apparent in the case of a water system; however, there is a return water circuit through the general supply. This might be compared to the grounded wire electric system, where the return current is made through the automobile frame to the battery.

If the motorist will take the wiring diagram in his instruction book as a guide and traces each circuit and then goes out to the garage and finds the wires on the car he will gain a better knowledge of how the electricity is applied to operate the various components than from any other method. It is not to be expected that the novice will master the details of the starting motor and generator at first, or those of the magneto or breaker box, or of the coil with its complications. Better results can be obtained by letting an expert handle these units. But if the car owner will

familiarize himself with the wiring system and comes to realize that nine-tenths of the trouble is caused by loose connections at terminals, a starved battery, broken wires or broken insulation that leaks current, or from dirty contact points in the switch or distributor box, he will be able to locate most of the probable troubles.

TO CLEAN HANDS OF GREASE OR OIL.

The motorist many times is at a loss to know of a ready means for removing grime from the hands caused by grease or oil from the car. Many kinds of prepared cleansers are on the market for this purpose and hardly a car owner but has had more or less experience with this class of sand soap cleansers. The prepared cleansers have a tendency to make the hands sore or chapped if used continuously, on account of the alkali in the cleansing compound. To avoid this and still keep the hands in good order, use kerosene for the first washing of the hands, rubbing the hands together, working the kerosene all over till the grease and oil is softened into a slime. Then bathe the hands in hot water, using common soap to remove the kerosene. The hot water and soap will remove all traces of the kerosene odor and will leave the hands in a soft and pliable condition. If kerosene is not available, ordinary soft oil, such as is used for engine lubrication, or for oiling machinery bearings, can be used. Rub the hands together in the same manner till the grease and oil is softened, then wash off the oil and grime with hot water and soap.

Sometimes it may be necessary to treat the hands a second time with kerosene to entirely remove all traces of grime. Following this method the motorist can keep his hands in a clean condition.

SPARE YOUR SPARE TIRES.

Automobile tires are wrapped in paper by the manufacturer because tire makers know that sunlight and air sap the strength of the rubber. They should be protected until they actually go on the rim for road service.

Statistics prove that a tire good for an average of 6000 miles when it leaves the factory will lose approximately 2000 miles of its life by being carried unprotected as a spare for one year.

A tire cover, made of rubberized coated fabric, will outlast many tires. It will cost less than the 2000 lost mileage on one unprotected spare.

Neatly covered spares look much better hanging on the back of the machine than do bare tires. The covers are water proof and can be washed without injury as often as the car is washed. They can be purchased in colors to match the body finish of the car.

Therefore, both from the standpoint of appearance and economy "cover your tires to spare your spares" is good, sound advice.

A tool box which can be locked is included within one of the doors of an up-to-date automobile.

Breaking in the New Motor Car

Motorists purchasing new cars should bear in mind a few simple rules that will tend to make their engines perform better and, in time to come, will save considerable expense and annoyance and the result will be a car that runs perfectly and gives the greatest efficiency.

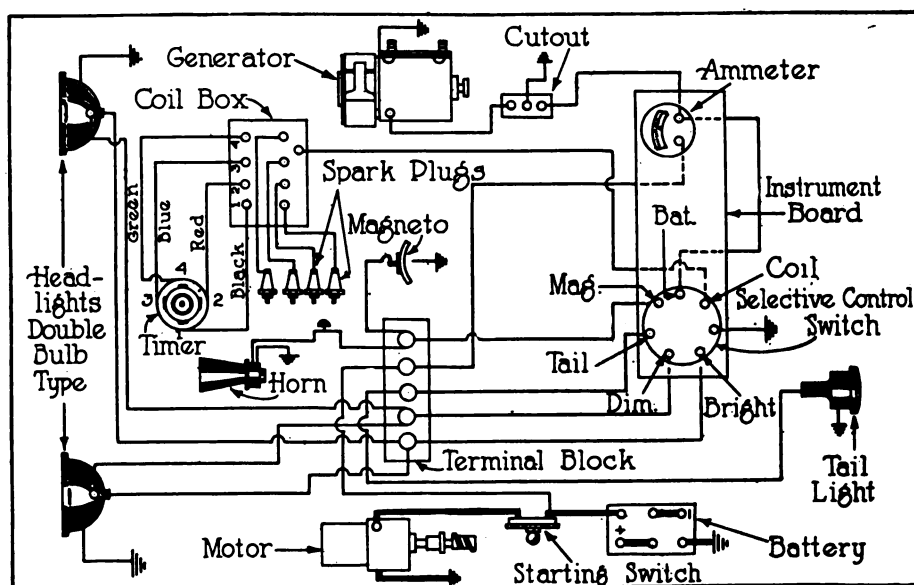
In breaking in a new engine always bear in mind that the parts are new, that the bearings are tightly adjusted, and necessarily stiff. An engine that is in this condition must be handled with care for the first few hundred miles, otherwise troubles are bound to occur that will cause the owner many anxious moments and expense.

Always drive the new car slowly and

stop in mud, clay or sand, snow or slush, if it can be avoided. Whenever road conditions are unfavorable, the smooth tread tires of the driving wheels should always be fitted with chain tire grips, to insure adequate traction.

FACTS IN REGARD TO SKIDDING.

There are two main facts regarding skidding that are apparent to anyone who drives a car. One is that a car skidding sidewise on the rear wheels slides over the smooth surface to a point where the surface is rougher and the tires begin to take hold. The skid, however, does not stop immediately at the first rough spot, but due to momentum and the weight of the car, grinds the rubber over the rough spot a certain distance, which has the effect of a rasp being used on the tires. This is particular-



Wiring Diagram, Liberty Starting and Lighting System on Ford Cars.

cautiously until thoroughly familiar with its control mechanism and the methods of stopping it.

When driving up grades on the higher gear ratios, if the engine shows any tendency to labor, shift back into a lower gear ratio, which has been provided by the manufacturer for that purpose. Many motorists believe that the best test of a car's ability is to rush all hills, or bad spots, on the direct drive. It should be remembered that the lower speed ratios were provided for use at all times when employing the third or fourth speeds might cause strains in the engine.

One should never attempt to drive cars at high speeds unless the tire casings are in perfect condition and the road surfaces good. In driving on clay or muddy roads, or on wet asphalt, care must be taken in turning corners, and the car should always be driven cautiously to avoid dangerous side slipping or skidding.

When driving on unfavorable highway surfaces, always keep one side of the car on firm ground, if possible. The brakes should always be carefully applied, especially if the road surface is wet. An automobile should never be brought to a

ly the case when the wheels are locked.

It is a well known engineering fact that railway cars with steel wheels running even on a glassy surfaced rail will, if the wheels be suddenly braked while the train is in motion, flatten a spot on the steel rim in a short time, so much so that the succeeding pounding of this flat spot will eventually split the rim. It is easy to imagine the effect on a rubber tire under the same action on a road surface when the car is braked suddenly when traveling in a forward direction. The wheels lock instantly, but the momentum and weight of the car drag the hot rubber along on the flat spots on the rear wheels. The placing of the hand on these spots immediately after will convince one that this does not need to occur very often to materially injure the tire. With chain equipment and common sense driving the car need not even start to skid and this grinding of the tires is unnecessary whether the pavement is slippery asphalt or ice.

The best method of cleaning spark plugs that have become fouled with oil is to boil them up in a solution of washing soda and water.

Electrical System of the Modern Automobile

AUTOMOBILE makers have made a study, through their engineering departments, of building and installing in their cars starting and lighting systems that shall be as nearly automatic in action as it is possible for units of their size and capacity to be. These components function nearly automatically, but it still remains for the motorist to give them proper attention at stated intervals.

The generator should be examined periodically and, should any carbon be worn from the brushes by the commutator and deposited in the lower part of the casing, it should be blown out with a tire pump. An accumulation of this dust may result in a short circuit between the brush carrier and the generator case.

The brushes are the part of the generator which demand the most care, and usually when trouble develops it starts with them. They should be examined to see that they are in perfect contact with

that they can be correctly replaced. If the wires are reversed, the ammeter will indicate a dead short circuit by swinging to the extreme on the discharge side of the scale when the engine is started and, if this defective condition is not corrected, the battery will soon be discharged.

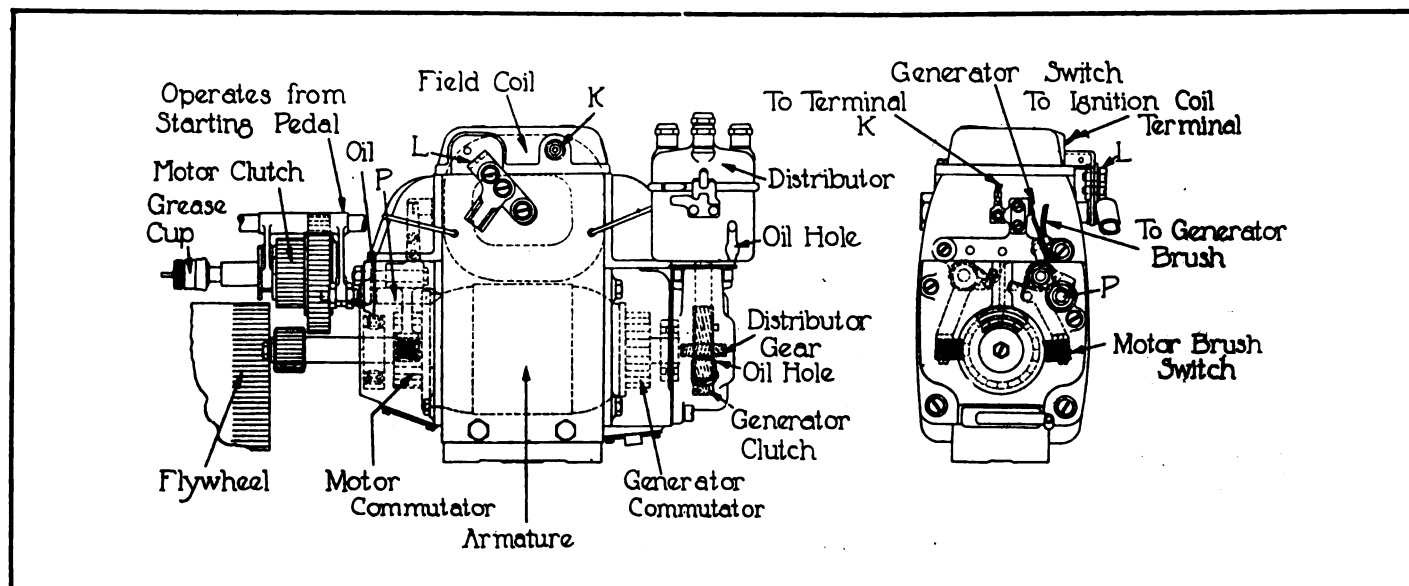
Special care should be taken with the connections in the lamps and at other points, such as the horn connections. A short circuit occurs when two wires of opposite polarity are in metallic contact. Under such conditions the storage battery will be discharged and there will be no light given by the lamps. A short circuit may occur at any point in the wiring system, but it is usually found at terminals that have been carelessly made or by worn insulation on wires.

A short circuit may be indicated by the position of the ammeter hand. Consequently it is advisable always to note the position of the index hand of that in-

REMOVAL OF PAINT FROM IRON AND STEEL.

Scraping or burning paint from the surface of iron and steel surfaces previous to the application of a new coat is a slow and laborious process. An easier and more rapid way of doing this work is the method used by the United States Coast Artillery for cleaning the exterior portions of big guns and gun carriages.

In practise, a one-pound can of concentrated lye is dissolved in three quarts of boiling water, and to this mixture sufficient lime is added to emulsify the solution. This solution is freshly mixed each time it is to be used and is applied with a brush and allowed to remain until it is almost dry. It is then removed and unless the paint is very old and thick it will come off with it. If one application of the mixture does not remove all of the paint the surfaces are washed off and a second coating applied. Before a new coat of paint is put on the surface of the



Modern Single Unit, Starting and Lighting Motor Generator, Delco System.

the commutator and that they do not stick to the brush holders. One of the most usual cases of imperfect contact between the brush and the commutator is insufficient spring tension.

The commutator must be kept clean, as any dust or grease on the segments will collect carbon dust and produce short circuits. The starting motor is also subject to electrical ills, among which are improper contact with some metal part of the generator or car, short circuits, brush and commutator troubles.

All wiring should be protected from the rotting action of grease, oil and water and, when a wire is run where these substances are liable to accumulate, the regular insulation should be supplemented by a conduit of insulating material such as fiber tubing or armoured cable. If the wires are removed from the generator for any reason, care must be taken to insure that they are put back on the same terminals as originally connected. Whenever any wires are disconnected from the units of the system, the wires and terminals should be marked so

that they can be correctly replaced. If the wires are reversed, the ammeter will indicate a dead short circuit by swinging to the extreme on the discharge side of the scale when the engine is started and, if this defective condition is not corrected, the battery will soon be discharged.

Special care should be taken with the connections in the lamps and at other points, such as the horn connections. A short circuit occurs when two wires of opposite polarity are in metallic contact. Under such conditions the storage battery will be discharged and there will be no light given by the lamps. A short circuit may occur at any point in the wiring system, but it is usually found at terminals that have been carelessly made or by worn insulation on wires.

A short circuit may be indicated by the position of the ammeter hand. Consequently it is advisable always to note the position of the index hand of that in-

PROLONG LIFE OF HANDLES.

The life of a hammer handle may be prolonged if the wedges and head are removed and the end soaked in oil when first purchased. The end should be placed in oil and allowed to remain for three or four days. It should then be removed, wiped off, and allowed to dry for a week before the head and wedges are replaced.

metal should be thoroughly cleaned with a solution of washing soda (in the proportion of half a pound to two gallons of hot water), and well dried either by wiping with soft cloths or by the application of heat.

CLEANING SPARK PLUGS.

An excellent method of cleaning mica spark plugs or, in fact, any mica unit, is to wash them in a 10 per cent. solution of acetic acid, which is an infallible solvent for grease and carbon deposits. The plugs should then be washed off with gasoline and finally dried by rubbing with a handful of waste or a cloth.

CAUSE OF SQUEAKING BRAKES.

When brakes squeak as they are being applied it is due to the brake linings becoming worn so that the heads of the rivets holding the lining to the bands strike the drum. Remove the bands and sink the rivet heads below the lining. If the linings are too thin renew them.

Proper Care of the Automobile Lighting System

IN most cases the lighting system of the automobile is of such a complicated design that the average owner will do well to leave repairs to the professional repair man when the troubles lie deeper than merely broken headlight lenses, broken bulbs or worn-off insulation. There are few owners who can set the regulator and cut-out successfully once it develops trouble.

The storage battery, ammeter, fuses, lights and wires should be studied and understood, however, so that ordinary care can be taken of them.

Storage Battery.

The storage battery has the first claim for attention. Anyone can easily learn to read the hydrometer, and this is probably the best and simplest method of testing a battery quickly for the novice. As the hydrometer is usually made of glass, the chance of breakage is ever present. Celluloid instruments can be purchased, however, which eliminate the liability to breakage to a considerable

back and forth several times till the brush fits the commutator perfectly. This adjustment had best be made by an experienced electrical repair man, for, if not made correctly, trouble is likely to follow.

Generator.

The generator brushes should be examined at intervals to note if they appear to be wearing unevenly. In which case they will offer more or less resistance to the flow of current and will cut down appreciably the efficiency of the generator. Sparking at the points of contact of the brushes and the commutator is to be avoided, as this damages the commutator segments as well as the points of contact.

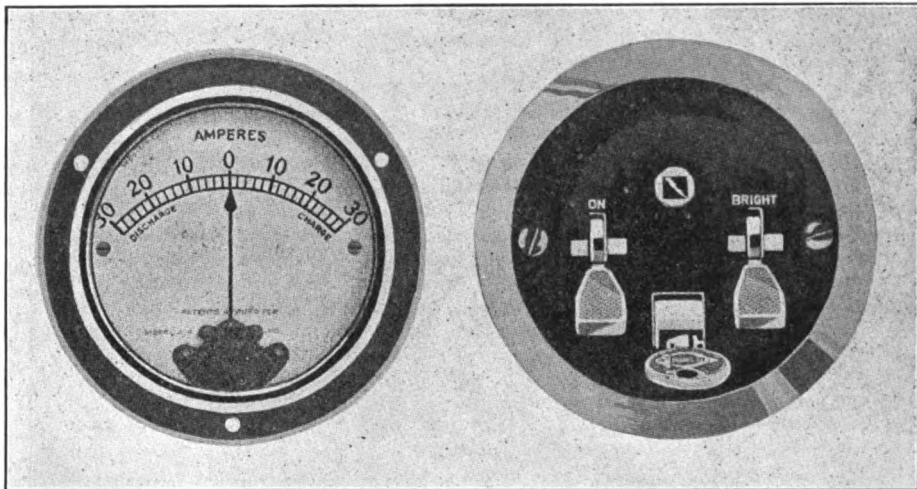
A foul commutator, or one that has become coated with oil or grease, is the occasion of this trouble many times, while imperfectly fitted brushes will also cause it. The remedy is to set the brushes properly, or to clean the commutator with a strip of sand paper.

rect reading. If this is suspected, to make a test, shut off the lights and disconnect the wires from the ammeter and note the position of the ammeter needle when at rest. If a faulty reading is noted, allowance for the variation must be made in consulting the ammeter, or a new one should be substituted.

Lamps.

Lamps that go out suddenly are an inconvenience, if not a positive danger. The proper precaution is to carry a duplicate set of lamps in the car, and when one burns out, refit a new one at once. The voltage of each lamp must be known for the individual car and the data compiled and carried conveniently by the operator for handy reference.

The voltage ratings of the instrument and tail lights are especially important. If they are marked 3V instead of 6V, this indicates that the lamps are connected in series; that is, the current passing through one light must pass through the other also. So if one light goes out the



At Left, Typical Form of Storage Battery; Center, Connecticut Ammeter, and Right, Connecticut Lighting and Ignition Switch.

extent. If the mixture taken up from the battery by the hydrometer shows a reading of between 1.275 and 1.300 specific gravity, the battery is being kept properly charged by the generator. Should the reading be around 1.200, it shows that the lights or starter are being used excessively.

When doing much night driving the lights are using much current which would otherwise charge the battery. More daytime driving and less using of the lights is the remedy. If the generator is equipped with a third brush adjustment, setting the brush ahead slightly will increase the charging rate and will help to keep the battery more nearly charged, where the lights are used excessively. However, when the season approaches that the lights are not required for such long periods, the generator third brush adjustment should be set back slightly to charge the battery at a lower rate. When fitting the third brush to the commutator, the brush should be abraded with a narrow strip of sand paper wrapped around the commutator, sand side next to the brush, and drawn

Brushes that spark should be repaired by an expert.

Ammeter.

The ammeter, "the watchdog of the battery," as it is sometimes styled, requires the attention of the car owner at frequent intervals. This little instrument, set in plain view of the driver in the dashboard, indicates the rate at which the storage battery is being charged by the generator and at which it is discharging to operate the lights of the car or the ignition system when the engine is operating below 10 miles an hour. With the car running at 20 miles an hour, all lights on, the ammeter needle should indicate "charge." If not, the battery is, or soon will be, discharged. Expert regulation of the generator is vital, as that device sometimes delivers more current than is needed. Also the ammeter should not indicate "discharge" when the lights and ignition are turned off. Look for a short circuit between the ammeter and switch and tape or otherwise insulate the wires thoroughly.

Occasionally the ammeter needle will become bent and will indicate an incor-

other will also. A three-volt bulb put into a six-volt receptacle will burn out in a few seconds, but a six-volt bulb put into a three-volt receptacle will suffer no harm, although giving a very dim light, as it offers a slight resistance.

Besides carrying an extra supply of light bulbs, the motorist should never be out of fuses provided, of course, that his car uses fuses in the lighting and horn circuits. Some makes of cars eliminate the fuses, depending upon a circuit breaker to protect the circuits in case of a short circuit in the wiring or connections. Learn the location of the fuse for each set of lights, by turning on all the lights and pulling out one fuse at a time, noting which lamps are extinguished. If a fuse burns out find the short circuit before putting in a new fuse; otherwise the fuses will burn out as fast as they are replaced.

As to the wires, the only attention they demand is to see that they do not wear through on the insulation through chafing and short circuit, or that the connections are not loose at the instruments or switch.

Women Proficient as Drivers of Motor Cars

ANY disparagement of the efficiency of women as drivers of motor cars is becoming less justifiable every day. Habitual participation in many forms of out-door sports, especially among the younger feminine set, brings to them, when taking up automobiling, a self-reliance and poise that prove invaluable when piloting the car through traffic. There are many women drivers whose management and guidance of their machines under the most trying conditions are such as to inspire the admiration and even to excite the envy of the most experienced men operators.

Any woman who will take the trouble to learn something about the operation and arrangement of the mechanical components of the automobile may become a successful driver. Changing gears is no more difficult for a woman who understands her car than running a sewing machine, but, from the beginning, she should be familiar with each step of

the engine when it is working efficiently. Having accomplished this, she should be able to throw out (disengage) the clutch, sense when the gears have stopped spinning, and drop into first without grinding the edges of the gears.

Sensing the psychological time to change gears comes instinctively after a short time if one pays close attention to the relative speeds of the engine and car. The unnecessary practice of driving long stretches in first and second speeds, when the car would operate more smoothly and with less strain on the working parts and the driver's nerves in high, would be entirely eliminated if more attention were paid to the sound of the engine. The fact that the engine is running at an unnecessarily high speed makes it impossible to change from one gear to another with any degree of safety, owing to the increased horsepower developed which, transmitted through the reducing gears in the gear-



Participation in Many Forms of Out-Door Sports, Especially Among the Younger Set, Brings to Women, When Taking Up Automobiling, a Self-Reliance and Poise That Prove Invaluable.

the operation and know exactly what is taking place. The mere act of throwing on the switch and putting the foot on the starter is not a positive guarantee that the engine will start every time. Perhaps once in a thousand or twice in five times the engine will not start. What is the matter? Any number of little things may be holding it up. The successful woman driver should know. She should understand just how far the spark lever ought to be advanced, how to enrich the mixture without choking the engine with gasoline, how far to open the throttle so that the engine will not race unnecessarily; she should know that annoying rolling of the engine is caused by an over-rich mixture.

She should understand perfectly how to operate the manual controls which are provided on most cars for the adjustment of the carburetor; she should realize that if the explosion fires back through the carburetor the mixture is cut down too lean. In short, she should be able to determine from the sound of

set, in turn multiplies the power, throwing many times the normal strain on the clutch, gear set, rear assembly, wheels and tires.

The young woman who can drive through crowded city traffic without continually changing gears, demonstrates that she understands her car. The adjustment of the carburetor plays a most important part in skilful driving when it is necessary to throttle the engine down low and, at the same time, be able to "pick up" with rapid acceleration, but, with practice and attention to the matters mentioned, together with other minor details, any woman can operate the modern automobile as easily and as safely as the strongest man.

Though many women are proficient in handling a car under favorable conditions, there is still a woeful lack of those who possess any measure of mechanical knowledge and are capable of making the adjustments that may be required when trouble develops in the open country.

EIGHT GOOD RULES FOR THE MOTORIST.

Following are eight suggestions which, if every owner will observe with regularity, he will have an automobile that is always ready to respond to his call for service.

1. See that the gasoline tank contains a sufficient quantity of gasoline; that there is plenty of oil in the engine reservoir; that the radiator is filled with water and that the tires are properly inflated.

2. Lift the hood and screw down grease cups; inspect the cooling system connections and the wiring to the magneto, or distributor, coil and spark plugs; oil the valve stems and push rods; inspect oil pump and fittings.

3. Screw down grease cups on front springs and front axle; see that the nuts on the spring bolts are tight; give grease cup on steering gear housing a turn to the right.

4. Remove floor boards and oil the gear shifting mechanism; also the clutch and brake mechanism.

5. Screw down grease cups on the rear springs and see that the spring bolt nuts are tight. Inspect the differential housing for loose nuts or bolts; examine the brakes and screw down grease cups over brake shaft.

6. Inspect body bolts; fill all grease cups with a good grade of medium weight grease; keep the wheel rims free from mud and sharp edges; clean the body and fenders; fill the lamps if necessary.

7. Occasionally jack up car under the frame; pry the spring leaves apart with a heavy screw driver and lubricate between the leaves with graphite mixed with oil; keep transmission case and differential case two-thirds filled with a good grade of medium gravity grease.

8. Occasionally drain oil from crank case and then flush out crank case by pouring gasoline or kerosene through the breather tube. Every 10 days or so put two tablespoonfuls of kerosene in each cylinder to cut carbon, and let stand overnight. If ever a foreign or unfamiliar noise develops, satisfy yourself as to what it is; negligence in respect to this may result disastrously.

BRAKE EFFICIENCY.

No part of an automobile is more essential to its passengers' safety than its brakes; hence there never should be a time that the driver has the least doubt that his brakes will work quickly, smoothly and effectively in any emergency. The only dependable safeguard is frequent inspection and oiling—especially during cold weather. Rods, levers and joints become soaked with water, mud and slush, and when the car is left standing for a short time (or even sometimes when running) the water and slush freeze, then when the driver attempts to apply the brakes he discovers that they do not operate properly, if at all.

A regular oiling of all brake parts will prevent such a condition and keep the brakes serviceable at all times.

Importance of Using a Good Grade of Oil

AN AUTOMOBILE owner who thinks that by using poor engine oil he is saving money in the operation of his car, is like the farmer who fastened green goggles over the eyes of his cattle before turning them into a dry pasture to graze. He is simply fooling himself and injuring the perfect action of his engine. For some years motor car manufacturers and service men have been recommending careful attention on the part of the driver in keeping the engine supplied with the correct amount of oil, but perhaps sufficient emphasis has not been placed on the correct grade of oil that should be used.

Before entering into any discussion about engine oils there should be fixed firmly in the mind the vital fact that proper lubrication of an engine is more important than any other item in its care. Most modern gasoline engines are automatically lubricated throughout. Manufacturers usually incorporate a combination pump and splash system which, in addition to lubricating the cylinder walls, supplies oil for the main, wrist pin and connecting rod bearings. A gauge is generally attached to the crankcase of the engine to indicate the supply of oil and another gauge is affixed to the dash in the driving compartment to show whether or not the oil is circulating properly throughout the system.

But no matter how good and scientifically an automatic lubricating system may be designed, no manufacturer can provide one that will do its work properly unless it is kept supplied with a good grade of engine oil.

Body and Quality Essential.

The exacting conditions within the engine can only be met by a good engine oil. The fundamental task of a lubricant is to prevent undue friction and heat; or in other words, to protect all contacting surfaces against destructive wear.

To more clearly illustrate the value of good oil, consider that the piston in each cylinder is moving up and down many times a second. Think what that means. Imagine the total amount of surface the pistons would be rubbing over if their travel was in one continuous line. And bear in mind the heat to which the piston and cylinder walls are subjected by the explosion of the gas mixture. To overcome the intense friction that otherwise would be created, a thin layer of oil must be maintained between the walls of the cylinders and pistons. Without this film of oil the pistons would soon seize or cleave to the cylinder walls. Almost any so-called engine oil will furnish the lubrication for a short time, but only oil of the correct body and quality will stand up in the long run.

Scored cylinder walls and scored pistons are common results of poor engine oil.

In all internal combustion engines a terrific heat is generated within the cylinders at the explosion of each charge of gasoline mixture. Most of the excess heat is removed through the cooling system, yet for the efficient operation of the

engine it is necessary that the cylinder temperature remain at a high point. So in addition to overcoming friction an efficient engine oil must also be able to withstand the heat resulting from combustion. If the oil breaks down under this heat it becomes no more of a lubricant than a thin film of water. Poor oil permits the moving surfaces to come into actual contact, which results in destructive wear.

Fouled spark plugs and pitted valves are usually due to an incorrect grade of lubricant, and when valves have to be ground the expense should be charged to poor oil. There should be likewise figured as lubricating expense, broken piston rings, worn wrist pins and the cost of eliminating engine knocks, cylinder and piston wear.

Some Points of Evidence.

If the oil pressure gauge on the dash of the car fails to register proper pressure after the engine has become warm, it is generally safe to conclude that the engine oil is poor.

If the oil fails to stand up under cylinder temperature, it weakens compression within the cylinder because it reduces the force of the explosion by letting gas escape by the pistons. This is not only a loss of power, but also a waste in fuel.

Another disadvantage in the use of poor oil is that it is weakened much more readily than good oil when on first starting a cold engine the gasoline vapor condenses and runs down the cylinder walls. The poorer the oil the easier it is for gasoline to wash out the film of lubricant between the pistons and cylinder walls.

Good oil will protect the main bearings, as well as the connecting rod and piston pin bearings, against destructive wear. When the crank shaft is turning at a rate of 1000 to 2000 revolutions a minute, a terrific heat would be generated between the shaft and bearings if the oil lacked sufficient body and quality.

How to Select Good Oil.

And now it may perhaps be wondered how to know the difference between good oil and poor oil. It is true that most oils to the layman look alike and feel alike; yet there is a vast difference in their quality and body. There is one sure way to discover the correct oil for the engine under the conditions under which it is operated and that is to consult the dealer from whom the car was purchased, who is in duty bound to carry the correct grades of oil for the cars which he is selling.

He understands the conditions which must be met in your particular part of the country and because he wants you to obtain the uninterrupted use of your motor car, he will specify the lubricant best adapted to your particular engine. And it is to your advantage to call for such brands when your oil supply needs replenishing. Because conditions are so varied throughout the country, motor car makers can best reach owners through their dealers, who are in a bet-

ter position to judge oils suited for the climatic conditions in their localities.

Two Methods of Testing Oil.

Several methods of testing oils are in use by analysts at the oil companies' laboratories, the character of the test depending on the result desired. Tests for the flash point, fire test, viscosity, carbon residue, evaporation and the cold test can be carried out only under laboratory conditions.

There are, however, two tests that can be carried out by the average garage owner, or motorist if he so desires.

The first is known as the heat test and the object sought is to determine the presence of unstable hydrocarbon and the amount of sulpho compounds or other impurities present in the oil.

In making the heat test fill a clean bottle about half full with the oil to be examined. Heat it up slowly over an open flame or on an electric plate until yellow vapors appear above the surface of the oil. (The temperature at which these vapors appear will depend upon the flash point of the oil tested.) Hold at this temperature for 15 minutes. A comparison of the heated with an unheated sample of the same oil tells the story of quality. Good oil darkens in color, but remains perfectly clear and without sediment, even after standing 24 hours, thus proving the total absence of acid compounds. Impure oil, on the other hand, turns jet black. If allowed to stand 24 hours, a black, carbon-like sediment appears, proving the presence of sulphuric or sulphonic acid compounds.

Emulsion Test.

For 100 per cent. hydrocarbon oils only. Fill a four-ounce bottle one-third full with the oil to be tested. Into this pour an equal amount of water, leaving a space of one-third free above the oil and water. Cork the bottle and shake well for 30 minutes. Then set the bottle aside for 24 hours. Good oil will show a fine white line of demarcation between the oil and the clear water below, indicating the absence of acid compounds. Impure oil, on the other hand, will mix permanently with the water, appearing as a curdled mass, floating upon milky water below. This indicates the presence of sulphuric or sulphonic acid compounds. The curdled portion is a sort of sulphuric acid soap, and the amount of the curd shows the quantity of "sulpho" compounds present. The result of this test is exactly the same as that of the heat test, but it has the disadvantage of requiring more time. To engineers and others making a study of oils it is worthy of notice, because of the fact that there is a certain quantity of water present in the crankcase of engines, due to the condensation there of the products of combustion. In making this test care should be used to select oil that has not been kept stored in bottles in the store or show window, as under these conditions it will absorb ultra violet rays from sunlight, and these rays will affect the test.

The Motor Car Bearings and Their Care

THE bearings of the motor car constitute one of the most important components and for this reason if a motorist is to thoroughly know his machine he should give them attention.

The bearings with which the modern automobile is equipped may be divided into three different classes, plain, roller and ball, the names themselves describing the types with considerable accuracy.

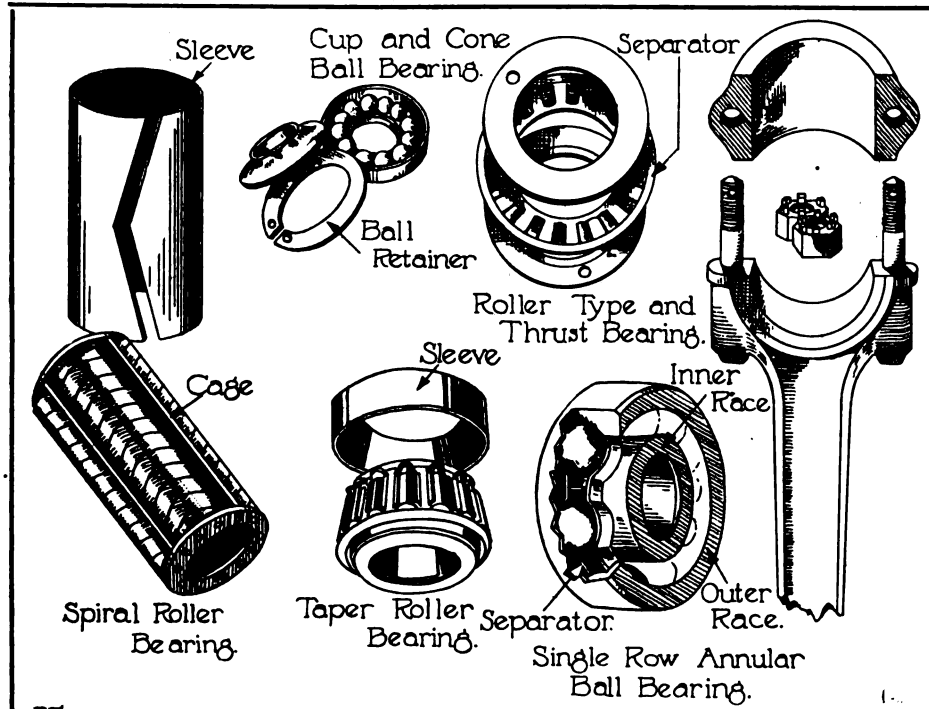
Plain Bearings.

The plain bearing consists of a cylinder which is open at both ends and split down the sides. Generally it is made of bronze and has a babbitt or soft metal lining, this being situated immediately against the rotating shaft. The babbitt and its supporting metal are securely locked together, and as a rule there are grooves, running crosswise of the bear-

ing should be installed, for if all the rollers are not of the same size the accuracy of the complete part cannot be maintained.

Roller Bearings.

These are cylindrical in form and vary in length. Each consists of a series of steel rollers which form the cylinder. They are divided into two main divisions, straight and tapered roller. There are also radial roller bearings and combinations of the two. These are generally used in the rear axle and rear wheels of the automobile. If one roller should become worn an entire new bear-



Types of Bearings Used in the Modern Automobile.

ing or at an angle, cut in the babbitt to permit of even distribution of oil. These bearings are used as supports for the crank shaft of the engine and also for the lower ends of the connecting rods where they connect with the crankshaft. There is also another type of plain bearing consisting of a bronze cylinder, without the babbitt lining. These are usually known as bronze bushings. They are found at the top of the connecting rods, in the clutch, on the brake pedals, etc., or any other place where there is little danger of excessive heat being generated. When the babbitted plain bearing becomes worn the result is generally a knock within the engine. When this occurs it may be remedied by removing a shim, a very thin piece of metal located between the two halves of the bearing, or filing away part of the metal where the two halves touch. A laminated shim is made consisting of many thin steel layers and by removing one or more of these the looseness or play may

be taken up. This babbitt lined bearing requires perfect lubrication for, if the bearing is permitted to run dry, excessive heat is generated through friction and the soft metal is soon melted, or burned out, this being denoted by a pounding in the engine. The burnt out or worn bearing should be replaced or repaired at the earliest moment, otherwise a ruined engine may result.

Ball Bearings.

These consist of steel balls which revolve between two holders or races. These are the most flexible bearings known and they consume very little of the power passing through them. Ball bearings are divided into several classes. There is the annular type, which has races in the form of rings; also the form which has an "L" shaped holder or race, with curved sides facing the balls. This is known as the cup and cone bearing, and they are adjustable, while the annular ball bearings are not. This cup and cone bearing is also classified according to the way in which it carries the load, as thrust or radial. Ball bearings are built which will withstand both radial and thrust load. Then again bearings of this character are made which have two rows of balls. To function

properly these balls must not vary in size more than .001 of an inch. If one ball is worn through under-lubrication all of the balls of the set should be replaced with new ones. While oil is used to lubricate the plain bearing, medium weight cup grease should be used for ball and roller bearings, and the best grade of grease is none too good.

Every time the bearing is removed from the car it should be washed thoroughly in kerosene and dried on a clean, dry rag. It should be kept free from water, dirt, grit or other foreign substances, any of which might be sufficient to ruin the entire bearing assembly. Before replacing the bearing, after it is washed, fill with new, clean grease. Caution should be exercised in tightening the bearing in the housing. See that the nuts are turned down evenly so as not to cramp the bearing in any way. The operator should never hurry in replacing the bearing, but should see that every step in the work is done correctly.

SOLDERING ACIDS AND SOLDERS.

As the formula for this acid is not generally known it may be worth while for readers to add this one to their collection. The acid is composed as follows: Solution of chloride of zinc, one ounce; glycerine, one ounce; alcohol, seven ounces.

So far as the solder itself is concerned compositions of tin and lead can be made in almost any proportion to fill general requirements. The melting point of these different compositions varies greatly, however, according to the proportions of the above metals used. This is an important factor in many instances, especially when metals to be soldered have a low melting temperature, in which case the solder should be a composition which will melt at a comparatively low temperature. If bismuth is included in the composition the melting temperature will almost invariably be lowered.

The table given below shows the respective melting temperatures and the metals best adapted for making solder compositions:

Tin	Lead	Bismuth	Melting Temp.	
			Deg. Fah.	
15.5	32.0	52.5	205	
20.0	26.0	54.0	214	
20.6	26.8	52.6	217	
21.4	27.8	50.8	225	
24.8	22.1	53.1	237	
20.0	20.0	60.0	250	
15.0	25.0	60.0	257	
63.2	36.8		361	
60.0	40.0		372	
70.0	30.0		381	
50.0	50.00		415	
34.0	66.0		446	
30.0	70.0		495	

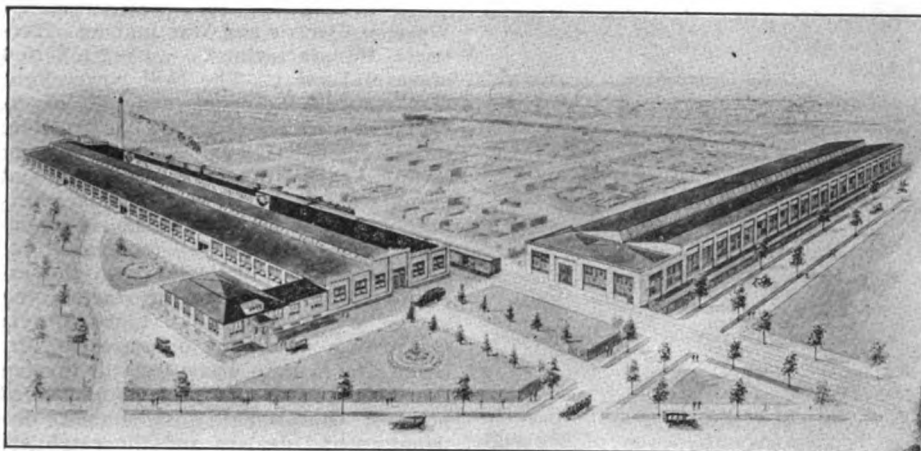
While the windshield is still dry, rub it lightly with cotton dipped in glycerine. Repeat this operation at intervals and the windshield will always afford clear vision in rain or snow.

A good method to remove the stains from glass bottles is to fill them half full of water and then put in a handful or two of cast iron borings, coarse ones preferred. Shake well.

NOTES OF TRADE AND INDUSTRY

New Building for Winther Co.

The Winther Motor Truck Co., Kenosha, Wis., has broken ground for a large addition to its present plant which.



Addition to Kenosha Plant of Winther Motor Truck Co.

it is anticipated, will be ready for occupancy about Aug. 30. The new structure will be 60 feet wide by 400 long, of modern saw-tooth construction, with concrete floors, brick walls, and a wide sky-line extending the entire length of the building. It is designed with particular attention to high-speed production and will be equipped with every necessary labor-saving and safety appliance.

The shipping facilities will be excellent as spur tracks will pass between the two buildings making up the plant, to the Chicago & Northwestern railroad. Chassis construction will be continued in the present unit and the new building will be used exclusively for the final assembly, painting and inspection of Winther trucks and the Winther Six, the new passenger car. It is stated that this extra manufacturing space will enable the Winther Co. to more than double its present output.

NEW PRICES ON DORRIS CARS.

Following is the latest schedule of prices on Dorris cars and trucks, as announced by the Dorris Motor Car Co., St. Louis, Mo.:

Model 6-80 passenger car: Seven-passenger touring, \$4785; four-passenger tourist, \$4785; four-passenger coupe, \$5800; six-passenger sedan, \$6290; chassis, \$3770.

Dorris trucks: K-4 two-ton, \$3400; K-7 3½-ton, \$4400.

STEVENSON GEAR CO. CHANGES NAME.

The Stevenson Gear & Manufacturing Co., Indianapolis, Ind., has changed its name to Stevenson Gear Co. and increased its capitalization to \$10,000,000. Plans are now being made to build a

modern factory as an addition to its present extensive plant.

This company has recently perfected a multiple gear cutting machine which, it is claimed, will revolutionize this branch of the automotive industry.

The officers are as follows: President, T. J. Stevenson; first vice president, G.

R. Stevenson; second vice president, S. McQuiston; secretary, G. E. Stevenson; treasurer, E. D. Johns.

FUEL ECONOMY WITH LIBERTY.

To illustrate the economy in the consumption of gasoline effected by certain improvements made in the power plant of the Liberty cars, manufactured by the Liberty Motor Car Co., Detroit, the statisticians of the company estimate that, on the basis that 15,000 cars will be built this year, and that each will have been driven 8000 miles within a year, if each car travels 16 miles to each gallon of gasoline, which is the lowest average yet reported, this would mean a total saving for Liberty car owners of 1,071,428 gallons of fuel within a year's time. Or, on the other hand, it means that they can cover about 17,142,848 more miles with the same fuel consumption as is ordinarily required.

BENNETT INJECTOR CO. BUYS WOOD INTERESTS.

An announcement of interest to garage men and automobile and truck manufacturers is that the Bennett Injector Co., Muskegon, Mich., has purchased the interests of the A. J. Wood Manufacturing Co., Grand Rapids, Mich., which has been manufacturing the Wood no-valve grease injector, which is designed for pumping heavy grease direct from the original barrel container into gear cases and transmissions.

The Wood injector is quickly and simply attached to any grease barrel, which may be carried on a special truck to any part of the garage or factory. The lubricant can be applied quickly, without handling, where needed and with great accuracy, as the pump is gauged to throw exactly one-quarter of a pound of grease a stroke. A special non-drip nozzle instantly stops the flow of grease when the pump ceases to operate.

The Bennett Injector Co., with a capitalization of \$50,000, is already under production in its new plant, with sufficient orders on hand to keep it in operation at its full capacity. Thomas B. Bennett, formerly of the Koelbel-Bennett Auto Supply Co., Overland distributor for Muskegon county, is president and general manager.

SPLITDORF CO. MOVES NEW YORK BRANCH.

The Splittorf Electrical Co. has transferred its New York branch, formerly located at 3 West 61st street, to the main office, 98 Warren street, Newark, N. J., where additional facilities for the prompt and efficient handling of the demands of its customers are available. This closing of the New York office does not mean that the Splittorf interests will be without representation in the Metropolis, as an office will be maintained at 225 West 57th street, where information in regard to Splittorf products will be available at all times.



Factory of Bennett Injector Co. at Grand Rapids, Mich.

Truesdell Promoted by Firestone Company

O. E. Truesdell has been appointed district manufacturers' representative for the Firestone Steel Products Co., Akron, O. He will take over portions of the territories heretofore handled by L. W. Enos and A. B. Droeger, with headquarters at Chicago and Detroit, respectively. His jurisdiction will now include the states of Ohio and Indiana, and he expects to make his headquarters at the Firestone branch at Indianapolis. Mr. Truesdell has been with the Firestone Steel Products Co. for three years, starting in the trade sales department and later working into the manufacturers' sales division at Akron.

L. E. Wagner, corporation sales manager for the Diamond T Motor Truck Co., Chicago, has resigned to accept a similar position with the Oneida Motor Truck Co., Green Bay, Mich. Mr. Wagner has been identified with the motor truck business for the past 12 years, first with the Baker Electric Vehicle Co. and later with the Diamond T. His knowledge of both gasoline and electric vehicles and his high standing in the industry make him a valuable addition to the Oneida sales organization, which now includes such well known men as H. J. Butler, for many years prominent in the Edison Storage Battery Co., who is sales manager; W. C. Calvert, W. J. Burns, W. D. Hawley, Newton Cox, Jack Moss, Sidney J. West, Charles A. Clark and A. G. Ingram.

O. S. Barrett has been appointed advertising manager of the automobile division of the Studebaker Corporation, with headquarters at South Bend, Ind. He succeeds R. C. Sackett, who has joined E. S. Gehagen, Studebaker distributor at Cincinnati, O. Mr. Barrett joined the Studebaker organization 22 years ago as office boy in the timekeeper's office, and has never been connected with any other concern.

Robert G. Jones, agent for the Brockway truck in Boston, has leased from Daniel Cerussi the two-story automobile building in process of erection at the corner of Winslow road and Commonwealth avenue, Brighton. The building is of reinforced concrete and steel with a broad frontage on the avenue and runs back 130 feet on Winslow road.

Charles Lee and August S. Robinson of Scranton, Pa., have formed a partnership to be known as the Robinson-Lee Motor Co., and will succeed the Columbia Sales Agency in the distribution in northeastern Pennsylvania of Stearns-Knight and Columbia Six cars and Denby trucks. The new concern is soon to have new headquarters at 528 Mulberry street.

Burr A. Kennedy has purchased from Gustav Krueger the Tudor garage at 6321-6325 Broadway, Chicago, for \$45,000. He has also bought from Martin J. Mullen the vacant lot south adjoining the Tudor garage for \$15,000, and plans to build a two-story fireproof building, covering the entire lot, to cost \$55,000.



O. E. Truesdell, District Manufacturers' Representative, Firestone Steel Products Co.

E. A. Bardol of Boston, for the past 32 years connected with chains of five and 10-cent stores and for the past eight New England manager of the F. W. Woolworth Co., has resigned and will devote a part of his time in the future to Hare's Motors of New England, of which he is the treasurer and one of the principal stockholders. Hares Motors has taken over the Locomobile branch on Commonwealth avenue and is distributing, in New England, the Locomobile, Mercer and Simplex cars and Riker trucks. Mr. Bardol is also an official of Parke-Snow, Inc., operator of a chain of dry goods stores.

Messrs. Klee and Huff, automobile dealers, have purchased the business stand of H. Feldman on Main street, Westminster, Md.



I. C. Lamb, Sales Manager, Automatic Light Co., Ludington, Mich.

Lamb Sales Manager Automatic Light

I. C. Lamb has been appointed sales manager of the Automatic Light Co., Inc., Ludington, Mich., maker of the Holt power light unit. Mr. Lamb was formerly a member of the sales staff of the General Electric Co., where he specialized in fractional horsepower motors. He was still earlier connected with the Western Electric and Westinghouse Electric & Manufacturing Co. during a period of several years. The Holt power light is a compact, self-contained unit of exceptionally simple and rigid construction. It generates a 110-volt current, placing it on a par with central stations, and permits the installation of standard wiring, snap fixtures and the use of standard household electric appliances. It operates without batteries with the exception of a small one for starting the engine. The Automatic Light Co. is primarily a marketing organization. Mr. Lamb's immediate activities will involve the development and perfection of sales policies, educational work among distributors and dealers and the establishment of definite marketing routines.

President Herr of the Westinghouse Electric & Manufacturing Co., and President Osborne of the Westinghouse Electric International Co., who have been for several months in Japan studying industrial conditions, have been decorated by the Emperor of Japan with the Order of the Rising Sun, the highest honor in the gift of that potentate. The Westinghouse company has had close relations with Japan for a long time, having supplied that country with a great deal of machinery. It has also undertaken the training of a number of Japanese students at its works.

F. Knowlton, W. Metkiff and E. M. Beyhl are directors of the C. I. Building Corporation of Brooklyn, N. Y., which has bought the property at 529-533 West 55th street through to 526-532 West 56th street, west side, New York City. The site has a frontage of 100 feet on each street and a depth of 200 feet, and it is understood that a service station and garage is to be erected thereon.

C. John Epping has been selected as Brooklyn distributor of Maibohm Six cars by the Allen-Waring Auto Corporation, metropolitan distributor. Mr. Epping is located at 1291 Bedford avenue, in the building formerly occupied by the Studebaker agency. This is also the headquarters for the sale of the King Eight car.

F. L. Kellogg is manager of the New York office of the Electric Storage Battery Co., which has moved from the quarters it has occupied for a quarter of a century at 100 Broadway to the National Association building, 23-31 West 43rd street.

H. W. Suhl and W. H. Vesper, bankers, are to build a tile garage at Mazie, Okla.

W. M. Shaw has sold his garage at Moline, Kan., to D. R. Trimble & Son.

UNITED STATES CO. PROMOTES ANDERSON.

The United States Tire Co. has promoted P. C. Anderson to the position of western sales manager, with headquarters at Chicago. Mr. Anderson has been manager of the Chicago branch for several years. He started in the rubber business 23 years ago as an office boy with Morgan & Wright and worked up through various clerical positions until in 1910 he became assistant branch manager in Chicago. On the formation of the United States Tire Co. he was made office manager at Chicago and a year later central district office manager. In 1914 he became manager of the Minneapolis, Minn., branch. Five years ago he was promoted to the position of branch manager at Chicago and Jan. 1, 1917, became Chicago district manager.

MILLER CO. INCREASES SALES.

The increase in sales of the Miller Rubber Co., Akron, O., in 1919 over 1918 was slightly over 60 per cent., and this was easily the record year for Miller. Whereas an increase in business of approximately \$5,000,000 was shown in 1918 over 1917, the biggest growth up to that time in the history of the company, the record of increase for 1919 over 1918 was close to \$10,000,000.

NEW OLDFIELD TRUCK TIRE.

A further demonstration of the growth of the Oldfield Tire Co., Cleveland, O., is seen in the recent announcement by President Barney Oldfield of that company that its distributors are soon to be supplied with a complete line of cord tires for commercial cars.

The Oldfield Giant cord successfully passed all tests several months ago. Except in its increased size and in details of design consequent on this, the Giant cord follows closely the characteristics of the Oldfield passenger

car tires, which have become well known during the past year. The cords themselves are of the multiple type, the tread is of the familiar arrow-head type, and the tread material is zinc tempered, a factor in securing toughness which was developed through President Oldfield's racing experience.

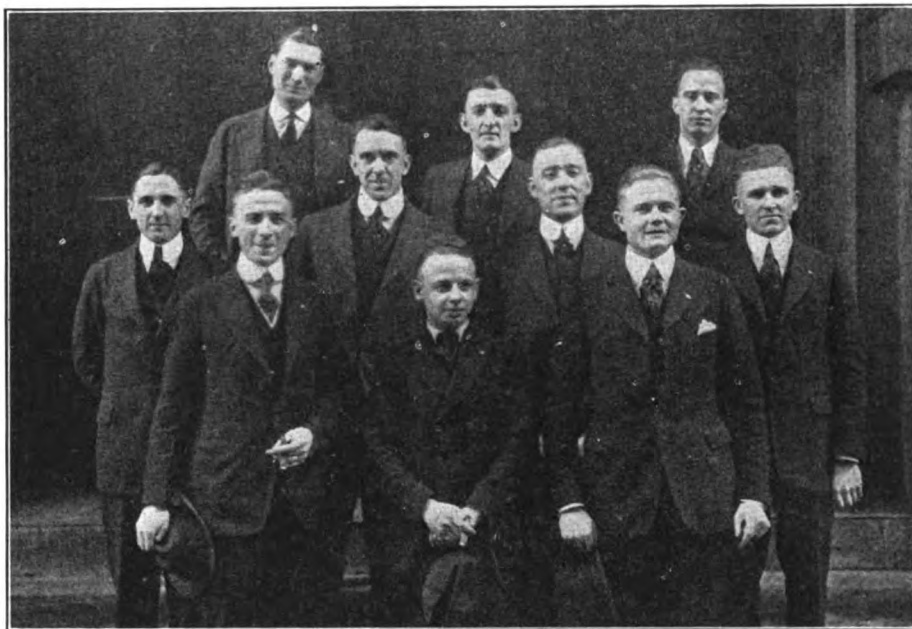


Visitors Welcomed at Goodrich Plant

THE B. F. Goodrich Rubber Co., Akron, O., believes that almost every person is a potential purchaser of Goodrich products and so confident is it of the efficiency of its manufacturing policies that it invites the general public to see for itself how Goodrich prod-

GOODRICH RECAPITALIZATION PLAN RATIFIED.

The stockholders of the B. F. Goodrich Rubber Co. have ratified the recapitalization plan whereby there will be issued immediately \$30,000,000 five-year



Group of Guides at Factory of B. F. Goodrich Rubber Co., Akron, O.—Left to Right, Bottom Row: J. M. Grey, C. L. Carl, A. L. Jordan. Left to Right, Middle Row: E. J. Lutz, W. G. Dellabough, J. R. Beattie, C. R. Miles. Left to Right, Top Row: D. W. Fairleigh, J. J. Cregen, M. Kennedy.

ucts are made and how scientifically the company treats its factory problems.

Ever since 1914 this company has been giving thought and attention to this feature of good will promotion. It realizes that a large part of the public is interested in acquiring facts about the various items of the every day merchandise it purchases. This information should be made easy for it to acquire. There are two ways in which the purchasing public can become informed, viz., by seeing for itself, or by learning from the retail seller.

The Goodrich company lays particular stress on the work of showing the dealer just how its product is made, so that he, in turn, may pass the information along to the ultimate purchaser. While all visitors are welcomed the Goodrich latch string hangs out particularly long to the dealer. Whether coming singly, in pairs, or in large groups—wholesale and retail merchants are always welcomed.

Thousands of visitors go through the Goodrich factories every year, a glance at the register showing names from Argentine, Brazil, Panama, Peru, Colombia, Hongkong, Calcutta, Calgary, Nome, Toronto, Ottawa, and in fact, from almost every country on the globe and from every state in the Union. Among the large groups which have recently made visits to the factory were the Foreign Trade commission, which recently made a tour of the United States; the Oklahoma Chandler dealers and the Cleveland Automobile Manufacturers.

seven per cent. gold notes, convertible after April 1, 1922, into common stock at \$80 a share, or at the rate of 12½ shares of stock for each \$1000 in notes.

The authorized common stock is increased from 600,000 shares of \$100 par stock to 1,500,000 shares no par stock. Of the new stock, 600,000 shares will be exchanged, share for share, for the old common stock, 125,000 are set aside for sale to employees, 375,000 are reserved for the conversion of notes and the remaining 400,000 are available for future requirements.

PAY-AS-YOU-RIDE SALES.

Farley & MacNeill, wholesale and retail jobber and distributor of tires and automobile accessories on Federal street, Boston, has adopted a pay-as-you-ride plan for the sale of its stock, which is meeting with success, it is reported. It was quite a hazardous proposition at first to sell tires on the deferred payment plan, but it developed one outstanding feature, the elimination of inferior goods, for customers could not be expected to pay for poor tires if trouble developed during the deferred payment period.

L. L. Heldacher, manager of the Memphis, Tenn., branch of the Firestone Tire & Rubber Co., Akron, O., is authority for the statement that that company intends shortly to open a branch in Arkansas, probably at Fort Smith.

Rudisell Heads Over- land Tire Co.

Among the tire manufacturing companies that have just gone into production is the recently organized Overland Tire & Rubber Co., Omaha, Neb. This concern is headed by Fred C. Rudisell, who is known throughout the western territory as a tire salesman of superior ability, his official title being general manager, secretary and treasurer.

Ten years ago Mr. Rudisell started in the tire business as a salesman for the Gustin Bacon Manufacturing Co., Kansas City, Mo., distributor of Diamond tires in that territory. Shortly afterwards he was appointed manager of the Diamond branch in Omaha, Neb. Seven years ago he left the Diamond company to take charge of the Firestone interests in Omaha as branch manager, with territory embracing the states of Nebraska, Colorado, Wyoming, southern South Dakota and western Iowa. While in charge of Firestone affairs in Omaha, that territory rose from a place 11th in volume of Firestone sales and ninth in cost of operation, until five years later it was first in volume of sales, first in economy and lowest in percentage of operating cost, and the amount of business during his last year with Firestone was \$2,000,000.

When Mr. Rudisell considered embarking in the tire manufacturing business on a personal basis, the formation of the Overland Tire & Rubber Co. offered the desired opportunity. As an example of the confidence placed in Mr. Rudisell by the tire trade in general it may be cited that several of the new company's most important distribution centers were contracted for even before an Overland tire had been seen by the distributors. The



Fred C. Rudisell, General Manager, Secretary and Treasurer, Overland Tire & Rubber Co., Omaha, Neb.

company today is working at full capacity with plans agreed upon for a largely increased production next year.

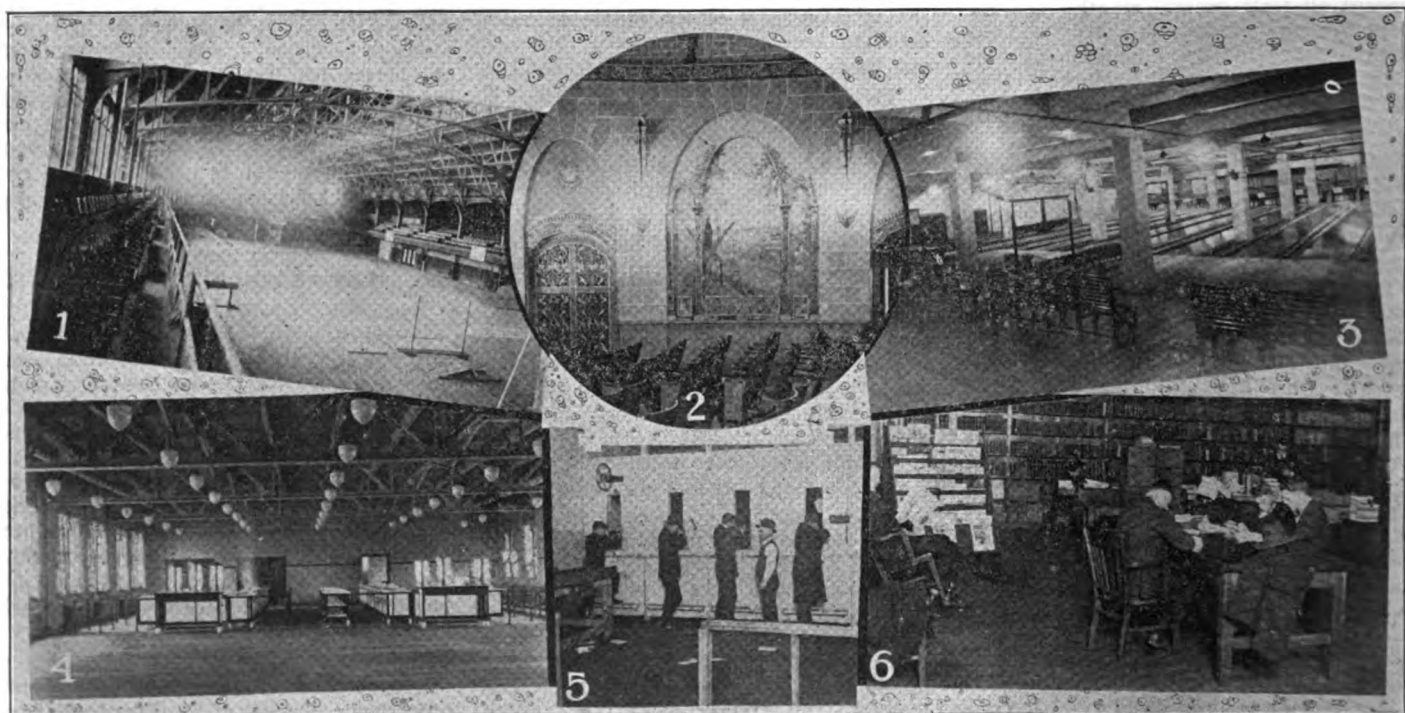
AARONSON JOINS GORDON CO.

B. E. Aaronson, who has succeeded M. S. Lines as sales manager of the Gordon Tire & Rubber Co., Canton, O., was special sales representative of the Mohawk Rubber Co. for three years, previous to which he was in the sales department of the Empire Tire & Rubber Co., and also with the Goodyear organization.

Beautiful Goodyear Hall at Akron, O.

GOODYEAR HALL, the handsome new industrial university and recreational building for the 35,000 Akron employees of the Goodyear Tire & Rubber Co., was formally dedicated recently at Akron. Elaborate ceremony attended the dedication, with addresses by President W. O. Thompson of Ohio State university at Columbus, President F. A. Seiberling, and Vice President C. W. Seiberling of the Goodyear Co. and Factory Manager P. W. Litchfield, who is chairman of the Goodyear Industrial university board of education. Following the dedication the building was thrown open for public inspection.

The principal feature embodied is the creation of Goodyear Industrial university, the first institution of its kind in the world, and a college second in size in Ohio only to Ohio State university. It has a faculty of 117, an enrollment exceeding 5500 and offers studies ranging from elementary grade school work to post graduate work for college men and women. The university is designed to offer free educational advantages to all bona fide employees of the company so as to fit them for their work and to broaden their scope of learning. H. E. Blythe has just been appointed manager of the university. He is 30 years of age and probably the youngest college head in America. Under him A. C. Horrocks has charge of educational work, with physical development and athletics in charge of Coach Ed Conner, famous during the war as director of recreation and athletics at Camp Sherman. Most of the students enrolled in the university are



Interior Views of Goodyear Hall: 1—Gymnasium, One of Largest in Country; Will Seat 5000; Floor Permits Playing of Five Games of Basket Ball Simultaneously. 2—One of Two Murals in Auditorium; Painting Is of the Bay of Naples. 3—Bowling Alleys, 12 in Number. 4—Cafeteria, One of the Largest in the Country; Will Accommodate 2000 an Hour, and Is Equipped with Conveyors for Dirty Dishes and Automatic Dish Washing and Drying Machines. 5—Six Rifle Ranges in Basement. 6—Goodyear Library for Employees.

manual workers. There are also special courses for office employees and executives.

Conceded to be perhaps the finest industrial university and recreational institution in the world, Goodyear Hall represents one of the most pretentious buildings ever erected by an industrial concern for the welfare of its employees. Complete in every detail, the building includes an auditorium of handsome appointments and with a seating capacity of 1686, the largest stage and theater in Akron and one of the largest in Ohio; a gymnasium which ranks in completeness of equipment and size with the greatest college indoor athletic stadiums in the United States, bowling alleys, target and rifle ranges, bath rooms and lavatories for Goodyear university, a cafeteria capable of accommodating 8000 daily, and dormitory rooms for both men and women, in addition to recreational rooms and the spacious library.

In the basement are locker rooms with 5500 lockers, 12 bowling alleys, six rifle ranges, a large clothes checking room and barber shop. Wide corridors bisect the main floor longitudinally, separating the 12 store rooms and the auditorium and gymnasium. The auditorium is regarded by architectural experts and interior decorators as one of the most elegantly appointed auditoriums in the state. The main floor and suspended balcony will seat 1686. The stage is 40 feet across, with double apertures, so as to permit its use by both the main auditorium and gymnasium. The gymnasium will seat 5000 people. An indirect lighting system is used throughout the auditorium with the exception of hanging candle fixtures casting a mellow glow upon mural panels arranged in attractive manner on the side wall. French Renaissance decoration scheme is used.

The immense gymnasium, with gallery, has a floor space of 172 by 100 feet, large enough to permit five basketball games simultaneously.

On the second floor, in addition to the auditorium balcony and emporium and balcony to the gymnasium, are tool rooms, writing and music rooms, a spacious and well equipped library and a large community room for men. In the triangular space near the intersection of Goodyear avenue and East Market street are located dormitories for 300 men.

On the third floor are located the legislative chambers of the House of Representatives and Senate of the Goodyear Industrial Republic.

The remainder of the same floor is devoted to women's recreational rooms, including a large and airy assembly room, planned for sewing and domestic science classes. This floor also includes dormitory provisions for women.

The Goodyear Industrial university will occupy the entire fourth floor. It includes accommodations to permit an enrollment of 5500, the 65 class rooms and studies being augmented by fully equipped laboratories on the fourth and fifth floors for various courses of study. Near the front of the building a large student's assembly room also is provided.

An industrial cafeteria, equipped with

every up-to-date culinary appliance, will occupy the second floor.

On the seventh floor are well equipped picture departments.

GOODYEAR CLINCHER TYPE PNEUMATICS.

Statistics compiled by automobile clubs and chambers of commerce in the United States show that 58 per cent. of the 7,000,000 automobiles operated in the country use small sized tires, ranging from three to 3½ by 30. To meet this demand the Goodyear Tire & Rubber Co. has built the largest factory in the world devoted exclusively to the manufacture of clincher type pneumatics. Its capacity is 20,000 tires a day.

OPENING OF AJAX BRANCH AT SPRINGFIELD.

E. D. Winans, New England district manager of the Ajax Rubber Co., Inc., New York City, announces the opening of a new Ajax branch at Springfield,

Growth of Akron as Rubber Center

Recent reports from the United States Census Bureau give justice to the claims of the residents of Akron, O., that it is the fastest growing, most remarkable city in America. Ten years ago it had a population of 69,067; according to the latest census returns, it now has 208,435, an increase of 201.8 per cent., which is considerably more than that shown by any other city of 50,000 inhabitants or more.

The mushroom growth of Akron started about 12 years ago, just about the time the rubber industry passed out of the chrysalis stage and began to show certain signs of becoming what it is today—one of the foremost industries of the country. And it is averred that all that Akron is today it owes to rubber. The first rubber factory in Akron is stated to have been founded in 1870, just 50 years ago, by Dr. B. F. Goodrich, a



Goodyear Hall, Headquarters of New Industrial University and Recreational Activities of Goodyear Tire & Rubber Co. at Akron, O.

Mass., and the promotion of L. M. Snow, a former salesman, to the position of branch sales manager. Mr. Snow has long been identified with the automobile accessory trade and 12 years ago was appointed assistant secretary to the late E. A. Gilmore, at that time secretary of the Bay State Automobile association. Since that time he has traveled in Maine, New Hampshire and Vermont selling accessories.

AMERICAN TIRES IN CONSTANTINOPLE.

The American Red Cross in Constantinople has recently had requests for American tires from automobile owners in that city, they evidently forgetting that the Red Cross is not a trading concern. With this demand goes currency able to stand up to the American dollar. Many wealthy Armenian and Greek merchants in Constantinople own cars and price is apparently no consideration with them, even at unfavorable monetary exchange.

resident of New York. He started with 35 employees in a building 40 by 100 feet. Today the B. F. Goodrich Rubber Co. has 28,000 employees and 62 buildings with hundreds of acres of floor space.

The rubber industry received its first pronounced impetus when the bicycle was invented and rubber tires were first needed. The tremendous growth did not come, however, until automobiles were invented. Factories were expanded and thousands of new workers added to meet the demand for automobile tires. The demand has never been fully met and today the rubber companies are growing as fast or faster than they ever grew before.

In 1910 the rubber companies had 13,631 employees and produced goods valued at \$40,000,000. Last year the employees numbered 72,282 and the production was valued at \$427,796,000. During the same 10-year period the annual tire production increased from 4,000,000 to 20,000,000. At present the Akron rubber companies have about 80,000 employees.

**Stocks on
New York
Exchange**

Securities and Crude Rubber Markets

**Automobile
and Tire
Quotations**
NEW YORK STOCK MARKET.

Week Ended June 12, 1920.

Company	High	Low	Last	Change
Advance Rumely.....	35 1/4	33 1/4	35	+1
Advance Rumely, pfd.....	65	64 1/4	65	..
Ajax Rubber.....	67	66	66	-1
Allis-Chalmers.....	38 3/4	37	38 3/4	+ 1/4
Allis-Chalmers, 2nd pfd.....	78	77	77	+2
American Bosch Magneto.....	119 1/4	115 1/4	118	+2
American-La France Fire Engine.....	10 3/4	10 1/4	10 1/4	- 1/4
Bethlehem Motors.....	23 3/4	20 1/4	22 1/4	+1
Case, J. I., Co., pfd.....	94 3/4	94 3/4	94 3/4	+1 1/4
Chandler Motor.....	134 1/4	101	103	+3
Deere & Co., pfd.....	93 3/4	93 3/4	93 3/4	+1 1/4
Fisher Body.....	115 1/4	115 1/4	115 1/4	-10 3/4
Fisher Body, pfd.....	3	103	103	+ 3/4
Fisk Rubber.....	34 1/4	32	33 1/4	+1 1/4
General Electric.....	145 3/4	141	142 1/4	+3
General Motors.....	27 3/4	24 1/4	25 1/4	-1 1/4
General Motors, pfd.....	76 1/4	76 1/4	76 1/4	+1
General Motors, 7 per cent d b.....	83	86 1/4	86 1/4	-1 1/4
General Motors, 6 per cent d b.....	74	72 1/4	73 3/4	- 1/4
Goodrich, B. F.....	65 1/4	63	65	+1 1/4
Goodrich, B. F., pfd.....	91	91	91	+1 1/4
Gray & Davis.....	22 3/4	22	22	- 1/4
Hendee Manufacturing.....	33 1/4	32	33 1/4	+ 1/4
Hupp Motor Car.....	18 1/4	17	17 1/4	+ 1/4
International Harvester, N. w.....	135 1/4	126	133 3/4	+6 3/4
International Motors.....	59	54 3/4	59	+2 1/4
International Motors, recls. 25pd.....	19	19	19	..
International Motors, 1st pfd.....	79 3/4	79 3/4	79 3/4	+1 1/4
International Motors, 2nd pfd.....	68 1/4	68 1/4	68 1/4	..
Kelly-Springfield Tire.....	108 1/4	105	108 1/4	+ 3/4
Kelly-Springfield Tire, 8 per cent. pfd.....	96	96	96	-2
Kelsey Wheel.....	65	62	65	+2
Keystone Tire & Rubber.....	31 3/4	25 1/4	30 3/4	+3 3/4
Lee Rubber & Tire.....	31	28 3/4	30 3/4	+2 1/4
Martin-Parry.....	20 3/4	20	20	-1
Maxwell Motors.....	23	22 1/4	23	- 3/4
Maxwell Motors, cts. of dep.....	13	18	18	+ 1/4
Maxwell Motors, 1st pfd.....	40	40	40	-1
Maxwell Motors, 1st pfd., cts. of dep.....	37	37	37	+2 1/4
Mullins Body.....	38	38	38	-1
Pierce-Arrow.....	52 3/4	48 1/4	52	+1 1/4
Pierce-Arrow, pfd.....	94 1/4	94 1/4	94 1/4	+ 1/4
Republic Motor Truck.....	52 3/4	42 3/4	52 3/4	+11 1/4
Saxon Motor.....	10 3/4	9 1/4	10 1/4	- 1/4
Sinclair Consolidated Oil.....	32 3/4	31	32 1/4	- 1/4
Standard Oil, N. J.....	680	651	663	..
Standard Oil, N. J., pfd.....	101 3/4	100 3/4	101 3/4	- 3/4
Stewart-Warner.....	41 3/4	41	41	..
Stromberg Carburetor.....	79 3/4	70 3/4	78 3/4	+3 3/4
Studebaker Corporation.....	72 3/4	66 1/4	71 3/4	+2
Studebaker Corporation, pfd.....	93	92	92	-5
U. S. Rubber.....	97	93 3/4	96 3/4	+1
U. S. Rubber, 1st pfd.....	108	108	108	+ 3/4
U. S. Steel.....	94 3/4	92	94 3/4	+ 3/4
U. S. Steel, pfd.....	106 1/4	104 1/4	104 3/4	-1 1/4
White Motors.....	54	51 1/4	54	+2
Willys-Overland.....	20 1/4	19 1/4	19 1/4	+1 1/4
Willys-Overland, pfd.....	82	79 3/4	82	+2 1/4

CRUDE RUBBER, NEW YORK PRICES.

	Apr. 21 Cts. Per Lb.	May 21 Cts. Per Lb.
Para—Up-river fine.....	.42 @ —	.39 @ —
Up-river medium.....	.40 1/2 @ —	.38 @ —
Up-river coarse.....	.31 1/2 @ —	.30 1/2 @ —
Caucho ball.....	.33 @ —	.31 @ —
Islands fine.....	.42 @ —	.42 @ —
Islands coarse.....	.22 @ —	.22 @ —
Cameta.....	.21 1/2 @ —	.21 1/2 @ —
Ceylon—Smoked sheets, ribbed.....	.44 1/2 @ —	.38 @ —
Smoked sheets, plain.....	.23 @ —	.37 1/2 @ —
Madeira, fine.....	.44 @ —	.44 @ —
Knapsack.....	— @ —	— @ —
First latex pale crepe.....	.45 @ —	.38 1/2 @ —
Amber crepe.....	Nominal	Nominal
Clean brown crepe.....	— @ —	— @ —
Rio Nunes string.....	— @ —	.55 @ —
Palembang.....	.13 @ —	.13 @ —
African.....	.33 @ —	.33 @ —
Prime Surinam sheets.....	— @ —	.84 @ —
Centrales—Corinto prime.....	.32 @ .32 1/2	.29 @ .30
Esmeralda, prime.....	.32 @ .32 1/2	.29 @ .30
Balata, sheets.....	Nominal	Nominal
Guayule, wet.....	.27 @ —	.27 @ —
Balata, block, Panama.....	.57 @ —	.57 @ —

AKRON RUBBER PRICES.

	April 13 Bid	April 13 Asked	May 15 Bid	May 15 Asked
Amer. R. & T. com.....	88	91	83	88
Amazon Rubber.....	..	101	..	98
Firestone, com.....	183	188	158	165
Firestone, 6 per cent. pfd.....	95 1/4	96 1/4	93	94
*Firestone, 7 per cent. pfd.....	97	98	93	95
General, com.....	600	..	800	1000
General, pfd.....	100	100 1/4	101	162
*B. F. Goodrich, com.....	69	71	59	62
B. F. Goodrich, pfd.....	94 1/4	95 1/4	91	93
*Goodyear, com.....	385	395	350	360
Goodyear, 1st pfd.....	99 1/4	100	95	96
India Rubber.....	185	200	180	195
Kelly-Springfield.....	131	133	104	108
Mason, com.....	30	..	28	..
Mason, pfd.....	..	75	..	74
Marathon, com.....	50	53	..	50
Miller, com.....	183	188	163	175
Mohawk, com.....	..	335	..	300
*Portage, com.....	95	98	..	88
Portage, pfd.....	..	86	82	84
Republic, com.....	3 1/4	4	3	3 1/4
Republic, first pfd.....	..	65	..	65
Republic, second pfd.....	35	40	30	35
Rubber Products.....	110	125	..	110
Star Rubber, com.....	200	300	185	175
Swinehart, com.....	80	90	..	80
Swinehart, pfd.....	..	90	..	85
Phoenix Rubber, com.....	..	23	..	22 1/4
Phoenix Rubber, pfd.....	..	90	..	90
Standard Tire, com.....	200	225	175	195
Standard Tire, pfd.....	..	..	..	95

*Ex-dividend.

DIVIDENDS DECLARED

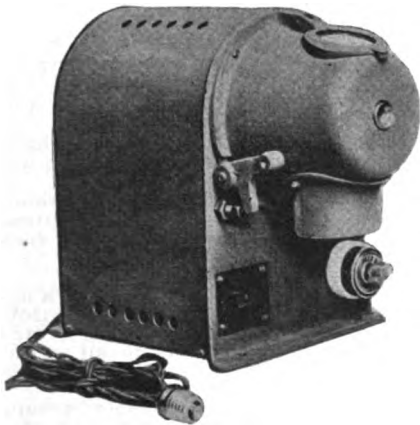
Company	Rate	Period	Payable	Stock of Record
Ajax Rubber.....	1.50	Quart.	June 15	May 31
Allis-Chalmers.....	1/3 %	.....	Aug. 15	July 31
Allis-Chalmers, pfd.....	1 %	Quart.	July 15	June 30
Barrett.....	2 %	Quart.	July 15	July 1
Barrett, pfd.....	1 %	Quart.	July 15	June 29
Bosch Magneto.....	\$2.50	Quart.	July 1	June 15
Bosch Magneto.....	20 %	Stock	July 15	July 1
Case, J. I. Threshing Ma- chine, pfd.....	1 %	Quart.	July 1	June 14
Chandler Motor.....	2 1/2 %	.....	July 1	June 15
Chandler Motor.....	33 1/3 %	Ex-stock	June 10	.....
Electric Storage Battery.....	2 1/4 %	Quart.	July 1	June 14
Electric Storage Bat. pfd.....	2 1/4 %	Quart.	July 1	June 14
Fisk Rubber.....	75c	Quart.	July 1	June 15
Fisk Rubber 1st pfd.....	\$1.75	Quart.	Aug. 1	July 21
General Motors.....	25c	Quart.	Aug. 1	July 15
General Motors.....	1 to 40	Stock	Aug. 1	July 15
General Motors, 6 % deb.....	1 1/4 %	Quart.	Aug. 1	July 5
General Motors, 7 % deb.....	1 %	Quart.	Aug. 1	July 5
Goodyear Tire & Rubber.....	3 %	Quart.	June 1	May 25
Goodyear Tire & Rubber.....	150	Stock	.....	June 14
Haynes Auto.....	60 %	Stock	.....	.....
International Motors, 1st and 2nd pfd.....	\$2.33	4 mos.	July 1	June 15
Kelly-Springfield, pfd.....	1 1/4 %	Quart.	July 1	June 15
Kelly-Springfield, 6 % pfd.....	\$1.50	Quart.	July 1	June 15
Keystone Tire & Rubber.....	30c	Quart.	July 1	June 15
Locomobile Co. of Amer- ica, pfd.....	1 %	Quart.	July 1	June 15
McGraw Tire & Rub. pfd.....	1 %	Quart.	July 1	June 20
Malbohm Motors.....	2 %	Quart.	July 1	June 15
Packard Motor Car, pfd.....	1 %	Quart.	June 15	May 29
Pennsylvania Rubber.....	1 1/4 %	Quart.	June 30	June 15
Pierce-Arrow, pfd.....	\$2	Quart.	July 1	June 15
Rainier Motor, pfd.....	2 %	Quart.	June 1	May 26
Robbins Body, pfd.....	1 1/4 %	Quart.	June 1	May 31
Sinclair Consolidated Oil.....	2 %	Stock	July 15	June 30
Stromberg Carburetor.....	\$1	Quart.	July 1	June 18
Stutz Motor Car.....	80 %	Stock	June 29	June 18
Stutz Motor Car.....	\$1.25	Quart.	July 1	.....
Texas Co.....	75c	Quart.	June 30	June 18
Tidewater Oil.....	2 %	Quart.	June 30	June 18
Tidewater Oil.....	2 %	Extra	June 30	June 18
U. S. Truck, pfd.....	\$2	Quart.	July 1	June 19
Willy Corp., 2nd pfd.....	\$1.75	Quart.	July 1	June 19

ACCESSORIES DEPARTMENT

The F-F Insulated Wire Stripper consists of a motor driven machine for use in electric repair stations, service stations, garages, etc. It is designed to simplify and shorten the labor required in stripping the ends of insulated, enameled, stranded and single conductor wire.

Duplex cord, it is stated, can also be stripped in much shorter time than formerly by the use of this machine. In some of the larger plants where it has been in use the capacity has been increased by as much as five times, is the claim of the manufacturer.

The device is guaranteed as to work-

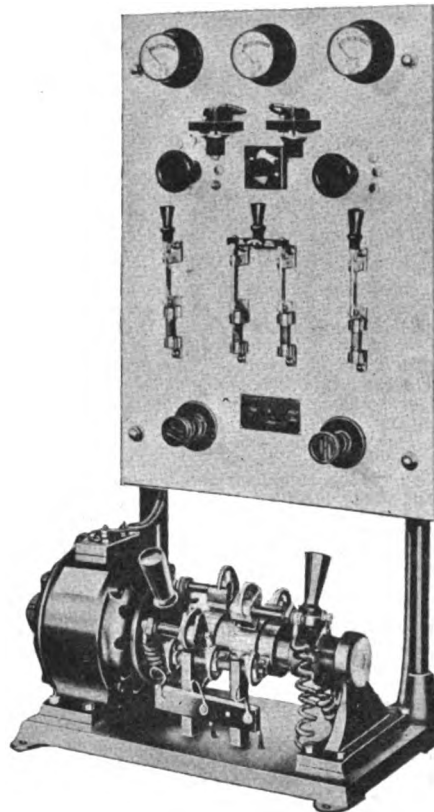


manship and performance. It must prove serviceable to the purchaser. Equipped with either single-phase, 110-volt, 60-cycle, alternating motor, or 110-volt, direct-current motor, as desired.

Manufactured by the France Manufacturing Co., Berea road and West 104th Street, Cleveland, O. Prices and literature on request.

The Advance Motor-Rectifier consists of a one-eighth horsepower motor, "special type," with an extended shaft, upon which are mounted three collector rings and two special commutators (as a unit), which absorb the alternating current from a transformer, as a three-wire circuit, and directly convert the alternating current into a direct current to two separately controlled circuits, in graduated voltages of 22-volt steps to 110 volts and normal capacity of one kilowatt a circuit, or 10 amperes at 110 volts. The total output of the rectifier delivering direct current is two kilowatts.

The special motor is designed for this class of work and is equipped with self-oiling ring bearings of rugged construction. The switchboard included with the outfit is mounted above the motor and is fastened to two uprights fitting into sockets in the motor base, and is constructed of marble, and containing the necessary switches, meters, automatic cut-outs and regulators to control the charging circuits. The transformer is mounted at the back of the switchboard and will handle up to 220 volts.



The device is fully warranted by the manufacturer to be fool-proof, who will make good for a period of one year from date of purchase any part that should contain a flaw, when returned to the factory postpaid.

Manufactured by the Advance Electric Co., 131 East Sixth Street, Los Angeles, Cal. Prices and literature on request.

The Johnson Universal Tire Lock is designed to lock and protect tires placed on rear or side tire hangers from being

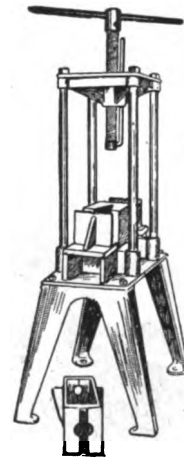


stolen. It is stated that the lock can be opened only with the keys provided by the manufacturer and that the cable is made of a specially constructed metal surrounded by armor steel sleeves, which interlock with each other, allowing free rotation, but will resist all efforts to separate them. It is claimed that they cannot be cut or injured by hammering.

The device bears the approval of the Underwriters' Laboratories, Inc., and is claimed to be thief proof.

Manufactured by the Johnson Automobile Lock Co., 2309 Archer Avenue, Chicago, Ill. Prices and literature on request.

The Whitney Arbor Press is designed for service stations, where many jobs are presented during the course of the year that require straightening, bending, forcing gears from shafts, etc. The press is



extremely light in weight for its capacity. Both the head and base are substantially webbed, supplying additional strength to those parts subject to the severest strain. The base is provided with ways similar to those of a lathe, permitting the blocks to slide into various positions, thus offering a firm foundation for the work. A large recess through the base allows the passage of shafts, gears, etc. The screw is made with a square thread, thus reducing wear to a minimum, it is claimed, the head being supplied with recesses, allowing the use of two bars when exceptionally strenuous pressure is necessary.

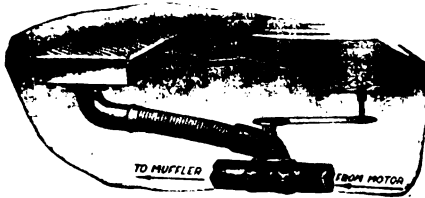
A patented feature is added to this press in the form of a guide rod sliding parallel with the screw and attached to a cap on the pressure end, preventing twisting strains on the surface of the work and relieving the assembly supports from strain. Accompanying every press are two sliding L blocks, one sliding V block, one round V block and an axle attachment designed especially for Ford axles.

Manufactured by the R. S. Whitney Manufacturing Co., 74 Nichols Street, Lewiston, Me. Prices, No. 1 press, \$70, east of the Rockies; No. 2 press, \$80, east of the Rockies.

(When Writing to Advertisers, Please Mention the Automobile Journal.)

The Noble Auto Heater is designed for both open and closed models of passenger cars, is manufactured in nine different types and embodies principles in construction that are unique.

The Noble heater, it is claimed, utilizes the waste exhaust heat from the motor, it being thoroughly protected in its passage to the radiator and on its return to the exhaust pipe, thus conserving the heat for heating purposes only, and not wasting it by radiation. Employing the principle of insulating the heater supply pipe,

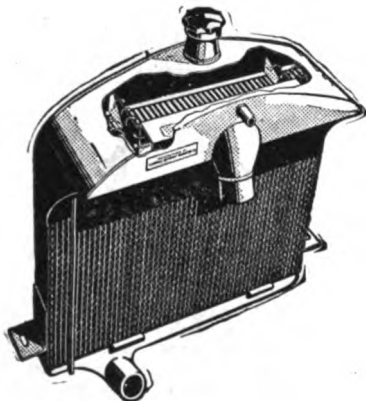


the hot gases reach the heater at a much higher temperature than if delivered through a single unprotected supply pipe. This principle of heat supply is patented by the manufacturer and insures a steady supply of heat at the heater regardless of atmospheric changes.

It is stated that, with this system of heating, it is impossible for the fumes of the exhaust gases to reach the occupants of the car, and that the disagreeable feature sometimes coincident with the use of exhaust heaters is eliminated in the Noble heater. The heater and its connecting pipe and valve are made of the best of material, the fittings are nicely finished and of a high grade, and the outfit can be easily installed in any passenger car in a few hours' time by a mechanic.

Manufactured by the Noble Heater Co., 347 East Lewis Street, Fort Wayne, Ind. Prices and literature on request.

The New Curran Radiator for Ford Cars, equipped with a patented simplified thermostatic control, offers several new features to Ford owners, chief among which is the impossibility of heating, the manufacturer stating that no Curran radiator has ever been known to boil. Over-cool-



ing is also claimed to be prevented by the thermostatic control, through an absolutely self-adjusting device which, it is stated, cannot get out of order, and regulates the flow of water. With this attachment the engine is operated winter or summer at an even temperature of 160 to 180 degrees.

Curran radiators are claimed to be constructed in such a manner that freezing of the water will not damage the radiator, the manufacturer citing cases where radiators have been frozen 18 times without the least injury. The factory will replace any Curran radiator damaged by freezing within one year from date of purchase.

Manufactured by the Curran-Detroit Radiator Co., 558-570 Lafayette Boulevard, West, Detroit, Mich. County distributors are wanted. A very attractive proposition is offered to dealers furnishing A 1 references. Prices and literature on request.

Trex Rim Tool is designed to remove and replace tires fitted to demountable rims of all kinds and sizes. It is strongly made of malleable iron constructed in the form of a jack and using a similar principle of operation. The stationary end of the device is hook shaped to fit over the edge of a rim, while a shoulder is provided which fits inside of the rim, pre-



venting the hook from coming loose on the edge of the rim.

A sliding bar is also provided which has a rack cast through its center. This is also equipped with a hooked end fitting the edge of the rim, while a shoulder is provided in connection with the hook which fits against the inside of the rim when forcing the split of the rim into place.

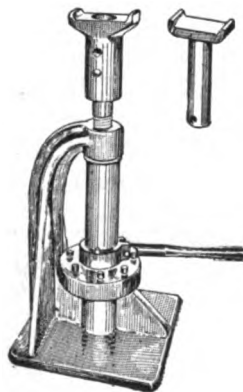
A handle is provided, fitted with a ratchet wheel at the lower end, which meshes with the rack of the sliding bar, while a combination ratchet is pinned to the handle a short distance above. This ratchet allows the lever to either expand the rim or by using a reverse motion to contract it.

It is stated that this device is capable of contracting rims that have become rusted to the tires, allowing easy removal of the tires, and that rims that have become bent or otherwise out of shape can be easily expanded to their correct position, so that they may be locked.

Full directions for operating accompany each tool, so that the operation may be easily understood even by the novice.

Manufactured by the Trexler Co., 1418 Walnut Street, Philadelphia, Pa. Price, \$6 net, or, West of the Rockies, \$7.

The Whitney Safety Automobile Repair Jack is designed for service stations and repair shops handling automobiles, trucks and tractors. It is perfectly proportioned throughout for this class of work, every part being webbed to warrant the greatest possible strength and safety. The base is made unusually large to insure a firm and rigid support for the lifted car or truck and possibility of the vehicle



working off from the jack is claimed to be eliminated by this wide base. The jack occupies but little space in the shop. An extension head is provided with each jack, affording a lifting radius $7\frac{1}{4}$ inches higher than the regular lifting radius. The jack is capable of lifting an axle 11

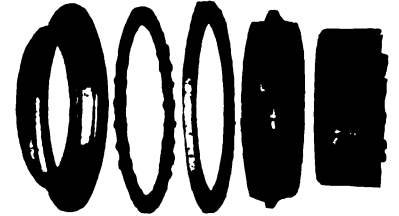
inches, plus $7\frac{1}{4}$ inches when using the extension arm.

This jack is manufactured in one size only and is stated to be adapted to all classes of work regardless of weight.

Manufactured by the R. S. Whitney Manufacturing Co., 74 Nichols Street, Lewiston, Me. Price, \$35, east of the Rockies.

The Anco Triple Duty Ball Thrust Bearing for Ford Cars is designed to take up any end play that may have developed in the crankshaft, magneto and transmission and to prevent further end wear.

The Anco bearing is installed between the universal joint housing and the clutch spring support and is adjustable to take



up all end play and to bring the vital parts into perfect alignment. When properly adjusted the bearing locks securely in position with a flat steel key and strong screw. After that all end thrust is taken



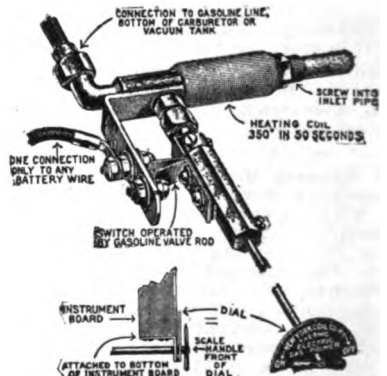
on the Anco heavy anti-friction balls and no further end play can take place.

It is claimed that many garages have adopted this bearing as standard for use in all Ford overhauling jobs.

Manufactured by the Anderson Co., South Bend, Ind. Price, \$12. Free instructions for installing are included with each bearing.

The Thermo Electric Gas Primer is a device that screws into the inlet manifold and delivers heated gasoline vapor and boiling hot liquid gasoline to all cylinders to facilitate starting action even on the coldest day.

It is formed of a brass chamber, around which is wound a heating unit connected through a switch to the battery wire. When the electric connection is made the



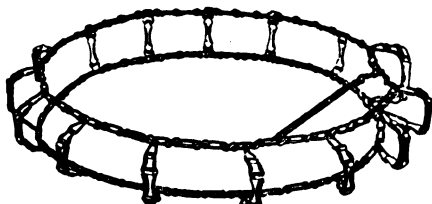
chamber becomes heated to a temperature of 300 to 500 degrees in about a minute. When the starter pedal is depressed a needle valve is opened and the vacuum in manifold sucks gasoline into the chamber independent of the carburetor action. This charge being highly heated, it gives off a highly explosive gas. The action is automatic when the switch is turned on and the needle valve rod is turned, and it does not require any hand pumping or filling. The tubing and wire for making the connections are furnished with the primer.

Made by New York Coke Co., 338-340 Pearl St., New York, N. Y. Retail price, \$5.

(When Writing to Advertisers, Please Mention the Automobile Journal.)

Woodworth Kant-Skid Tire Chains are of the side chain type but have the cross members designed especially for the purpose. They are made of steel stampings in such a manner as to present a smooth rounded surface to the tire and the sharp edges to the road thus causing, it is claimed, practically no wear on the rubber and taking the best possible hold on the road surface.

These cross members are so designed that they are small in the middle to avoid bumping on pavements but they take a stronger hold in mud or snow than chains of ordinary construction. On account of the Woodworth Kant-Skid chains causing practically no wear on the tire, it is stated, as well as on account of their great durability, it is claimed for them

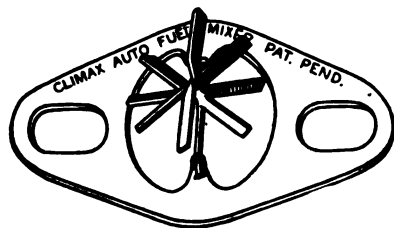


that they are much more economical to use, besides being dependable to take an excellent grip on any sort of road surface.

The same type of chains are made for solid tires, being called "Woodworth Truck Chains." These have the cross members made of half-oval steel so that they wear unusually long, cause no bumping, it is stated, and do not injure the tire.

Manufactured by the Woodworth Manufacturing Corporation, Niagara Falls, N. Y. Prices on request.

The Climax Automatic Fuel Mixer consists of a thin metal plate which is inserted between the flanges of the carburetor and the intake manifold, having cardboard gaskets placed above and below the metal disc to insure a tight joint when the flange bolts are tightened. The center of the metal disc is cut open the same size as the bore of the intake manifold and carburetor mixture flue, allowing the inrushing gas to the engine to pass. Above the opening and suspended from the sides is fitted the fuel mixer, which consists of metal arms fastened at the center to a cross member rigidly attached to the sides of the opening in the disc. The vanes of the fuel mixer are set at a



slight angle to each other, causing, it is stated, the coarser portion of the mixture, or that which has not previously been vaporized, to be broken up into a minute spray as the gaseous mixture rushes by the vanes.

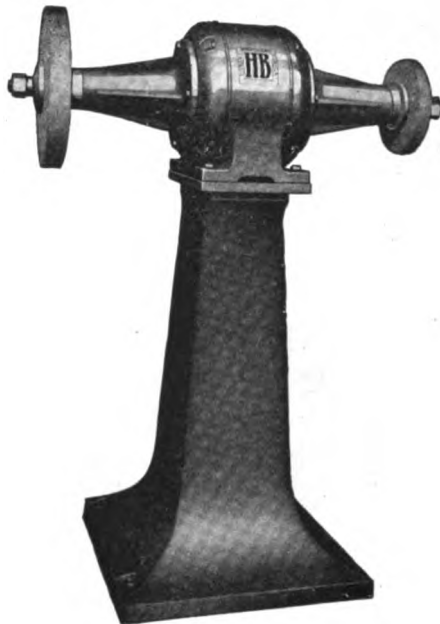
It is claimed by the manufacturer that higher mileage is obtained when the device is used, and that the engine develops more power and the tendency is also to keep the cylinders free from carbon. It is easily attached in a few minutes time by anyone familiar with the use of tools.

Satisfaction to users is guaranteed or money will be refunded. Distributor and jobbing trade solicited.

Manufactured by John B. Chace, South Attleboro, Mass. Price, one inch and 1 1/4 inch, \$1; 1 1/2 inch, \$1.50.

The H B Ball Bearing Motor Grinder is one of the newest time and labor saving machines manufactured especially for the grinding of castings, sharpening of tools, tire buffing and the thousand and one uses around the service station machine shop. The grinder is equipped with a two-horse-power quiet-proof ball-bearing electric motor and has ample power for all purposes around the shop.

A buffing or wire brush wheel can be substituted for one of the grinder wheels. The machine is strongly constructed throughout to stand up under the heaviest kind of continuous work. The sturdy base and ball bearings insure freedom from vibration, and it requires only a minimum of power to operate. Bearings require lubrication only once in every

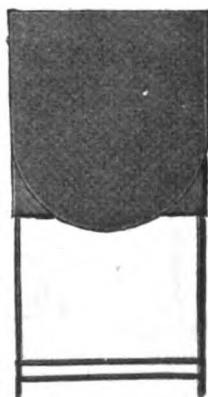


three or four months. The outfit, it is stated, is much more convenient for the operator than grinders driven by belt. All bolts and nuts are claimed to be sufficiently retained, so that they cannot fly off or break.

The H B ball bearing grinder is sold on an easy payment basis as are other H. B. products.

Manufactured by the Hobart Brothers Co., Troy, N. Y. Prices for two or three-phase alternating or direct current, \$35; cash and 10 monthly payments of \$15 each; for single-phase 110-volt or 220-volt, \$45; cash and 10 monthly payments of \$16 each.

The Handy-Pandy Folding Chair and Folding Table makes an ideal combination to have in the car when touring or on a vacation trip. The Handy-Pandy folding chair can be folded down out of the way when not in use, and when want-



ed for the carrying of two extra passengers is easily opened and placed in the tonneau of the car, allowing ample room

between the passengers of the tonneau without crowding.

The chair is made entirely of metal, the back and seats of 20 gauge, the legs of 1/2 inch band iron and the braces of 3/4 inch rods. When set up the seat is 17 inches from the floor. When folded the chair occupies a space of 10 1/4 inches by

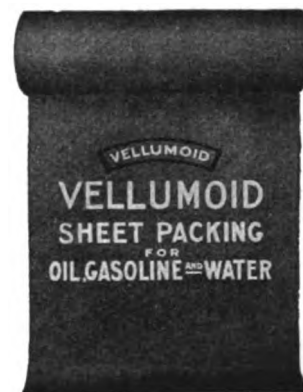


21 inches by one inch, a convenient size for storing under the seat.

The folding table, not shown, is made of the same material, but has the top marked for a checker board, and can also be used for many other purposes when camping.

Manufactured by the Pandolfo Manufacturing Co., St. Cloud, Minn. Weight of chair, six pounds. Prices and literature on request.

Vellumoid Sheet Packing and Gaskets have as a base a very strong vegetable fiber, which is chemically treated, making it the manufacturer states, oil, water, gasoline, grease and air proof and exceedingly tough. Owing to these properties Vellumoid makes an exceptional gasket for use on all oil, grease, water and gasoline connections, and all places where the con-



ditions call for a tough, durable packing. The only place the manufacturer does not recommend the use of Vellumoid packing is where it is subjected to a temperature of over 300 degrees Fahrenheit.

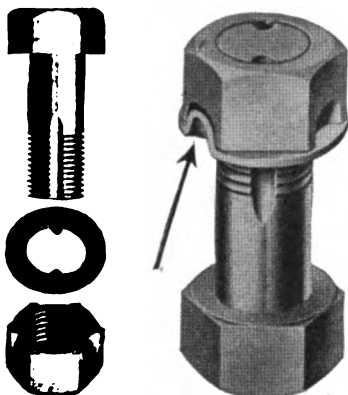
Vellumoid contains no rubber or rubber substitutes and no mineral matter. It is light in weight, very flexible and has high tensile strength. Because of its compressibility it makes a particularly tight joint and its toughness insures durability.

Manufactured by the Fiber Finishing Co., 67 Milk Street, Boston, Mass. Prices and literature on application.

(When Writing to Advertisers, Please Mention the Automobile Journal.)

The Stevenson Safety Nut and Bolt consists of a combination bolt, washer and nut. The bolt is constructed with two longitudinal tapered grooves, the washer with two inner extending lugs to fit the grooves on the bolt, while the nut is equipped with chucks on its lower and outer surfaces. This construction permits the easy application of the washer to the bolt before applying the nut, as the inner extending lugs do not begin to bind in the base of the grooves until the washer has passed on to the bolt for two-thirds of the length of the tapered portion of the grooves.

The bolt washer and nut are assembled and the nut washer carried home to contact. The washer binds in the base of



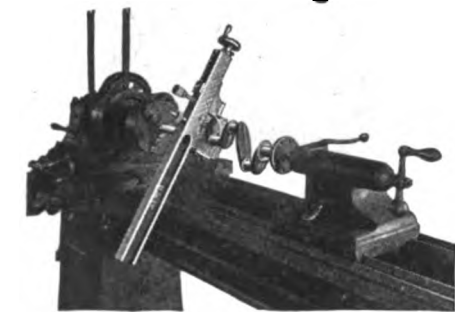
the grooves equally on both sides anchoring it against any lateral or horizontal movement without, it is stated, engaging the threads.

After the nut has been turned down sufficiently, the outer rim of the washer is upset into any one of the chucks of the nut, thus locking the washer and nut. To unlock nut, back down the bent portion of the washer, freeing the nut.

It is especially designed for use in service stations for replacement purposes where it is desired to use a shorter bolt, with the same assurance that it will hold as when a castellated nut and cotter pin is used.

Manufactured by the Safety Nut & Bolt Co., 1836 Euclid avenue, Cleveland, O. Prices on request.

The Weber Crank Pin Returning Tool is the invention of a California master mechanic for expediting work on engine crank shafts. It will be noted in the illustration of this device that it is a crank pin returning tool and works on any ordinary lathe. One view shows the tool in operation on a four-throw tractor crankshaft. The crankshaft is held between centers on a lathe, while all four pins are turned true and finished in one setting of the tool, the manufacturer states,



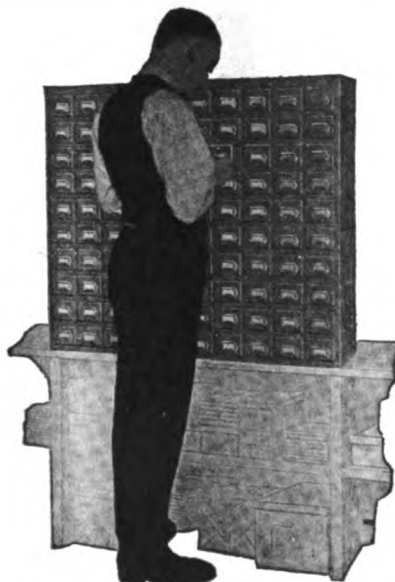
in from 30 minutes to an hour. The shaft is rotated very slowly, the tool riding around with the pin, the handle resting against the side of the lathe.

At the top of the tool is located a hand wheel which feeds the cutters into the pin. This wheel is fitted with a dial be-

low which is graduated into thousandths. The dial can be locked by means of set screws, in any position, thus making it easy to turn all pins to exactly the same size. The pin is held firmly in place, independent of the cutter, by three supports, one being a bronze shoe that can be adjusted while the tool is cutting. The tool starts cutting on the surface worn the least and gives an absolutely round pin the least amount of metal. Filing of pins, it is claimed, at the same time removing off-setting or the use of jigs to complete the job are not required as the tool finishes the pin accurately for use. The manufacturer guarantees that the tool will work within as close limits of accuracy as can be done by any other known method.

Manufactured by the Sawyer-Weber Tool Manufacturing Co., Los Angeles, Cal. Prices and literature on request.

The HB Universal Screw Cabinet is designed especially for service station stock rooms and has proved a great convenience in keeping track of the screw stock. The cabinet is constructed with well made, strong drawers to hold the dozens of small accessories, screws, nuts, bolts, brads, nails and many other small articles that so often become scattered about and

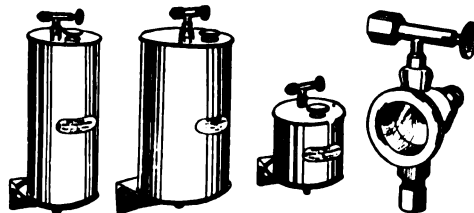


wasted. It is stated that such a cabinet will save its cost many times over in a year by providing a place where every small part can be stored and yet where they can be found instantly when wanted.

The finish of the cabinet is light golden oak, fitted with polished brass drawer pulls and card holders. The drawers are eight by three by 2 1/4 inches, inside measurement. These cabinets can be purchased in either 100 or 50 drawer sizes.

Manufactured by the Hobart Brothers Co., Troy, N. Y. Illustrated literature and prices on request.

The Whitney Gas Humidifier is designed to supply the combustible mixture with water vapor, producing pronounced flexibility, which means increased mileage accompanied, it is claimed, by the elimination of carbon.



The Whitney Gas Humidifier consists of an upright cylindrical tank acting as a reservoir for water, connected by means of copper tubing to a nipple in the intake manifold, allowing the water vapor

to be drawn into the engine cylinders by the vacuum caused by the motion of the pistons in the cylinders. Within the humidifier is a patented automatic shut off valve, located at the lowest possible water level, which checks the rush of air into the engine when the humidifier becomes empty, preventing it from acting as an auxiliary air valve if neglected.

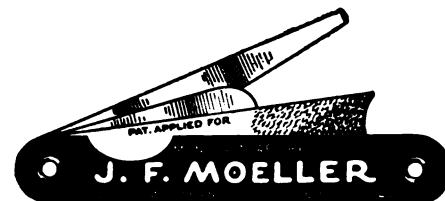
A sight feed gauge is provided with the device, which is connected between the humidifier and the engine intake manifold and acts as a constant tell-tale as to the amount of water being taken into the engine cylinders. An adjustable valve is provided on the gauge, which allows the operator to increase or decrease the amount of water taken in.

The Whitney humidifier is made in three models, each including a gauge.

Manufactured by the R. S. Whitney Manufacturing Co., 74 Nichols Street, Lewiston, Me. Price, east of the Rockies, No. 1, \$14; No. 2, \$16; No. 3, \$11.

The Momaco Spark Plug Tester is designed as a pocket tool, combining four tools in one for the benefit of the service station and garage repairer and all motorists. It consists of four blades folding neatly into a handle similar to a pocket knife, each blade having a special use.

Opening the two long blades, resting one on spark plug terminal wire and the other against the engine cylinder will short-circuit the plug and show if trouble

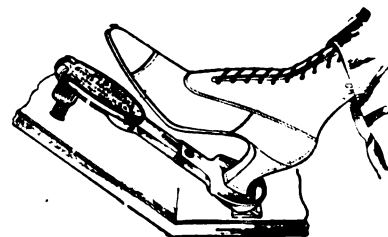


is present in the cylinder. A third blade is fitted with a file for cleaning points, while the thickness of either of the long blades will give the correct gap between spark plug points. The short, thin blade is a gauge which gives the correct clearance between the valve and tappet.

Manufactured by J. F. Moeller, 10632 South Western Avenue, Chicago, Ill. Price, 25 cents postpaid.

Rives Extension Accelerator Pad and Heel Rest No. 6 provides a flexible foot rest for the car operator when using the accelerator in driving the car. The foot rest is fastened to the floor boards by a hinged joint, the forward end resting lightly on the top of the accelerator button. The front of the rest is cushioned with a rubber pad, which makes the operation of the accelerator very smooth.

For lady drivers such a device is particularly valuable as much of the fatigue and strain is eliminated from the arch of

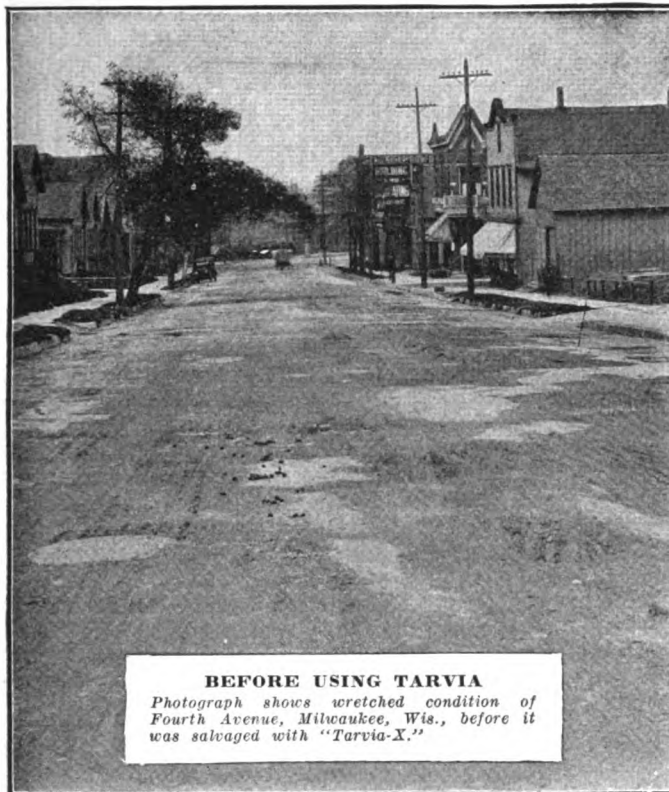


the foot when using the Rives extension foot rest.

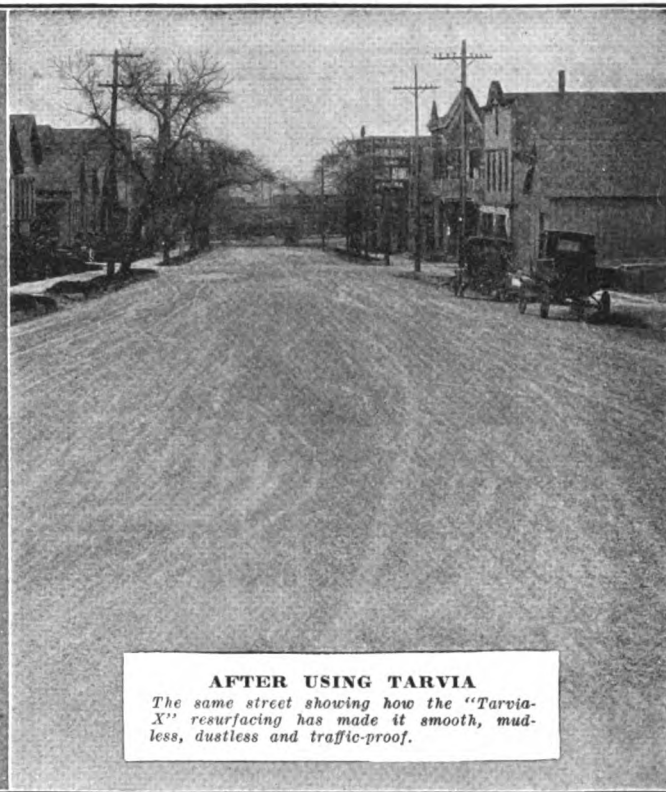
An extension adjustment is provided which allows the pedal to be extended or shortened when fitting the pedal into position. The Rives extension pedal and heel rest is made from steel with a japanned finish.

Manufactured by the George H. Rives Manufacturing Co., Inc., 2187 Woolworth Building, New York, N. Y. Price, complete, \$1.50.

(When Writing to Advertisers, Please Mention the Automobile Journal.)

**BEFORE USING TARVIA**

Photograph shows wretched condition of Fourth Avenue, Milwaukee, Wis., before it was salvaged with "Tarvia-X."

**AFTER USING TARVIA**

The same street showing how the "Tarvia-X" resurfacing has made it smooth, mudless, dustless and traffic-proof.

To Get Good Roads—Cheaply—Quickly— Save the Roads You Have!

MILES and miles of good gravel and macadam roads throughout the country can be restored to meet modern traffic requirements. The way to do this is to utilize the existing road as a foundation for a traffic-proof Tarvia top. And where crushed stone or slag is available, the community so favored not only can save its roads but *save* considerable money in the bargain.

Many progressive communities recognize this fact, and are carrying out an extended road salvage program, rather than build new roads at present exorbitant prices.

For example, the City of Milwaukee has

in this way transformed 1,700,000 square yards of water-bound macadam into splendid modern streets to the complete satisfaction of both the city authorities and the traveling public.

Whether you require a good binder for new construction, a dust-preventive, a patching or maintenance material, Tarvia, in its various grades, provides an economical and satisfactory solution.

Tarvia Roads are durable, dustless and mudless. They are also waterproof and frost-proof and require a minimum of upkeep expense.

Illustrated Booklet, telling about the various Tarvia treatments, free on request.

Special Service Department

This company has a corps of trained engineers and chemists who have given years of study to modern road problems. The advice of these men may be had for the asking by any one interested. If you will write to the nearest office regarding road problems and conditions in your vicinity, the matter will be given prompt attention.

Tarvia

Preserves Roads—Prevents Dust

THE BARRETT COMPANY, Limited

New York
Cincinnati
Minneapolis
Atlanta
Lebanon

Chicago
Pittsburgh
Dallas
Duluth
Youngstown
Montreal

Philadelphia
Detroit
Nashville
Salt Lake City
Milwaukee
Toronto

The *Barrett* Company
Toledo Columbus Richmond Latrobe Bethlehem
Winnipeg Vancouver St. John, N.B.

Boston
New Orleans
Syracuse
Bangor
Elizabeth

St. Louis
Birmingham
Seattle
Washington
Buffalo
Halifax, N.S.

Cleveland
Kansas City
Peoria
Johnstown
Baltimore
Sydney, N.S.

(When Writing to Advertisers, Please Mention the Automobile Journal.)



Monthly

20c the Copy

\$2 the Year



A Tractor Journal
devoted to the
tractor industry and trade



Published by
The Automobile Journal Publishing Company
PAWTUCKET, RHODE ISLAND

GREB RIM TOOL

BEACH PAT. PEND.



"Wallop" your rim with a hammer to force it in or out of place and you are bound to have greater trouble next time.

DO THE SENSIBLE THING.

Provide yourself with the best rim tool on the market and save time, trouble and rims.

GREB RIM TOOL

You can quickly expand or contract any make of cross-split demountable rim—the Greb is universal and takes them all, especially the Kelsey.

TEN DAYS' TRIAL. If your dealer or jobber does not have them we will send you one. Try it for ten days. If not satisfactory, return it to us and we will refund your money.

THE GREB CO., 201 State Street, Boston 9, Mass.

METZ Master Six

The car of the Year

A New England Product

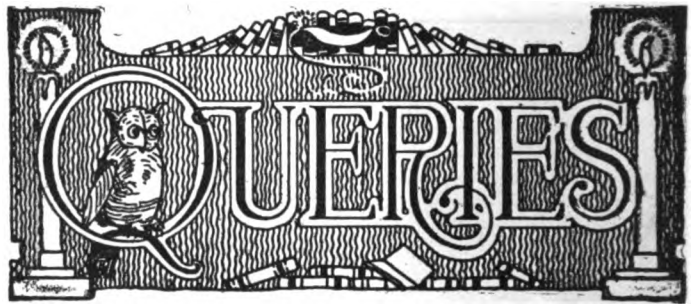
Honest through and through

\$2090 F. O. B. factory FULLY EQUIPPED

We are now extending our agency list
Information at request

METZ SALES CORPORATION
BOSTON, MASS.

(When Writing to Advertisers, Please Mention the Automobile Journal.)



PREPARING FOR TRANSCONTINENTAL TRIP.

(W. G. E., Salem, O.)

Can you give me information as to what is necessary on a 1919 Model 490 ——— to make a trip across the country to the Pacific coast? Will I require new springs or bigger fan? Also how much water must I carry, and full information in regard to such a trip. Where can I obtain maps showing the best roads to the Pacific coast?

We would suggest that you use either the Lincoln highway, the Pike's Peak highway or the National Old Trails. The first is probably the most direct route, while the second route parallels the first, touching it at points. The third route follows the Lincoln highway to Philadelphia, branching off there and running more to the south towards Washington. Turning to the west at this point the route follows through the southwest, passing through West Virginia, into Ohio, to Indiana and Missouri, joining the Santa Fe Trail at Booneville, Mo., following it through to Kansas City, across Kansas and a corner of Colorado, through New Mexico to Santa Fe. Continuing to San Bernardino the tourist comes into California, and from this point may run to Los Angeles, a distance of only 68 miles.

The mileage from New York via the Lincoln highway to San Francisco is 3322 miles; via the Pike's Peak highway from New York to San Francisco, 3594.2 miles; via the National Old Trails route, 3726 miles.

Maps of these routes can be obtained from the Lincoln highway headquarters in Detroit, Mich., S. A. Host, director of publicity; National Old Trails, headquarters, Kansas City, Mo., Judge J. M. Lowe, Railway Exchange building; Pike's Peak Ocean-to-Ocean route, headquarters at Colorado Springs, Col.

Unless you choose a route which crosses the desert, it will be unnecessary to carry any great amount of extra water or gasoline, as these can easily be obtained along the route, except when crossing the desert, and then an extra supply will be necessary. Extra tires and springs and possibly extra axles will be necessary, as these parts are hard to obtain except in the larger cities or towns where service stations are located.

NEGATIVE AND POSITIVE WIRES.

(W. J. W., Westboro, Mass.)

How may I connect up wires from receptacle placed on car to direct current, available to charge storage battery?

If the receptacle is a standard one the inner ring should be negative and the outer ring positive; if this is not the case the proper change should be made to meet these conditions. The leads to the storage battery should be properly marked + and —. To locate the positive + and negative — wires you will find the following method most practical:

To the battery terminal wires attach short lengths of copper wire. Dip the latter into a tumbler of water in which has been dissolved about two tablespoonfuls of salt and by holding these terminals about half an inch apart it will be noted that a great number of bubbles rise from one, while a few if any rise from the other. The wire with the greatest number of bubbles clinging to it is the negative or — wire. This wire should be connected to the pole marked — on the storage battery and the other to the + connection.

It has been assumed in the above answer that the direct current you have available does not exceed the voltage output of the battery to be charged, and that you have already brought about this result by the proper introduction of lights or other proper resistance.

OIL LEAKING BY RINGS.

(J. D. M., Beverly, Mass.)

I have a late model six of 1919 and am considerably bothered with oil collecting on three of the engine plugs. Have had all the rings renewed and lapped in and from the time that the rings were put in up to the present time the fouling of the plugs has continued. This causes missing and loss of power on hills and also a slight loss in compression. When the car was first purchased the muffler silenced the explosions perfectly, but now the explosions are very pronounced, in fact they sound almost as though the muffler were open.

The trouble that you mention, that of oil forming on the plugs, is common with the type of car which you have. The company has experimented with several devices and has finally selected one which it is felt sure will obviate the trouble. The proper course for you to pursue is to take your car to the nearest service station specializing on your make of car and have the trouble looked into. This will cheerfully be done and probably the only charge will be for labor and whatever material is used. The fouling of the plugs with oil moisture will easily cause the engine to miss and this might account for the irregular action of the engine.

The noisy muffler may be due to loose plates or a leaky connection in the exhaust line.

GAS LEAKS BY PISTON RINGS.

(J. H. O'C., East Providence, R. I.)

After overhauling my engine I notice that gas seems to leak past the pistons and through the valves when the engine is turned over by hand, although the valves have just been ground. The crank case and manifolds have not been put on as yet and I wish to know whether new piston rings are needed and whether the valves require further attention before putting the parts in place.

As the crank case is not yet replaced it is quite likely that leakage past the pistons is due to lack of oil on the piston rings. It is the oil that seals the rings and makes the pistons gas tight, and you had better wait until the lubrication system is operating before passing judgment upon the fit of the pistons. Before doing anything further to the valves make sure that there is sufficient clearance between the tappets and the end of the valve stems so that the valves do not hold open after the engine has become warmed thoroughly instead of being seated properly.

FREQUENT VALVE GRINDING.

(C. L. N., Poughkeepsie, N. Y.)

How many miles should an engine run between valve grindings? My engine will operate between 800 and 1000 miles between carbon removals.

No general rule can be given as to this. The nature of the valve metal and the manner in which the engine is operated and maintained are important factors. The exhausts usually require considerably more frequent grindings than the inlets. Under favorable conditions an engine should run several thousand miles without valve grinding. Leaky valves are best determined by cranking the engine by hand. If the compression is not well maintained when thus tested, valve grinding is probably necessary. Under existing fuel conditions your engine does not get fouled quicker than very many others. It is a good idea to test the valves just before removing the head for removing the carbon, as valve grinding is most easily done at the same time.

BRAKE ROD BECOMES STUCK.

(J. M., Marlboro, N. J.)

The brake on my Chevrolet 4-90 sticks to the drum. How can I remedy it?

Your trouble is probably in the rod which passes through the differential housing and may stick in the bearing points. This is the rod which contracts the brake band. See that it works freely at all points.

(When Writing to Advertisers, Please Mention the Automobile Journal.)



*All That Its
Name Implies—*

THE HEIGHT OF PERFECTION

You cannot secure more efficient and economical carburetion than by the Zenith. Simplest to adjust, and once adjusted stays adjusted.

Known the world over as the

ZENITH OF CARBURETOR EFFICIENCY

A long list of American builders of cars, trucks and aeroplanes believe this simple, plain tube device to be the best insurance for permanent carburetor satisfaction.

Zenith Carburetor Co.

New York Detroit, U. S. A. Chicago



50% additional wear built into your tires after they have reached the point when they are usually discarded. Save what otherwise would be wasted. This is a rebuilding plant operated by skilled workmen, the product of ten years experience building tires at the



Firestone and Goodrich factories.

We absolutely guarantee from three to thirty-five hundred more miles after our work is finished.

Brown Retread Tire Company

70 Clarendon St. Boston

TRACTOR WORLD

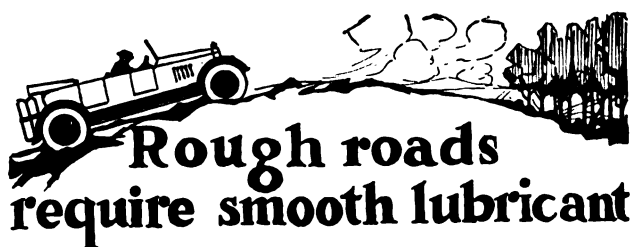
Monthly 20c the Copy \$2 the Year

A Tractor Journal devoted to the tractor industry and trade

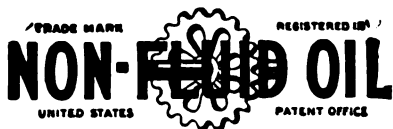
Published by

The Automobile Journal Publishing Company

PAWTUCKET, RHODE ISLAND



JARS of rough country roads tend to increase the pressure and strain of bearings and gears.



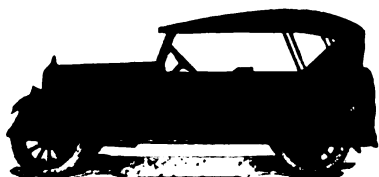
provides a permanent lubricant cushion that absorbs the friction and protects the parts. Look for the orange can.

*K-00 SPECIAL for gears
K-000 for all bearings*

New York & New Jersey Lubricant Co.
401 BROADWAY, NEW YORK

5 YEARS CONTRACTS

Write for territory and information on
passenger Cars and Trucks.
Separate contracts.



Winther "Six"

WINTHER MOTOR SALES CORP.
KENOSHA, WIS.

GREB AUTOMATIC GRIP PULLER

BEACH PATENT

A garage and repair shop necessity. Adjusts instantly, grips firmly and cannot unhook. As noted in illustration, it can be made into a two-arm puller. Also has three 12-inch arms opening to 18 inches. The



Grebe Automatic Grip Puller has many uses and will soon pay for itself. Ask your jobber or write for our Ten-Day Trial Proposition. You need this tool in your business.
No. 1 for.....wheels and large gears
No. 2 for.....magnetos and generators
No. 3 for.....average gears

THE GREB COMPANY
201 State Street, Boston, Mass.

MISSING AT HIGH SPEED.

(L. J. S., Cedarsburg, Wis.)

The engine in my six misses at high speed and I feel sure that this is an ignition trouble, because I have put in a new carburetor and had the valves ground. If I put in a new set of breaker points into the distributor or a new set of plugs into the engine cylinders, the car operates perfectly for about two weeks, when missing at high speed again occurs.

If the breaker points are found burned to too wide an adjustment and in a roughened condition after two weeks' use, it is possible that the generator is furnishing too high a voltage to the ignition system, or it may be that there is trouble with the condenser, which may be punctured, shorting it so that it does not absorb the excess current at the breaker points, and causing the points to burn or become roughened, due to the arcing which occurs between them as the current passes.

The resistance unit on the distributor head is not short-circuited, is it? If you find the spark plug gaps too wide, after two weeks' service, this would also indicate over-voltage on the system. Dirt on the inside of the distributor or poor insulation of spark plug cables causes missing at high speed usually.

OPERATING ENGINE ON KEROSENE.

(W. A. P., Lynchburg, Va.)

Will it do any harm to my engine to operate it on kerosene instead of gasoline, using the regular carburetor now fitted to the engine? In so doing, should a heavier cylinder oil be used? Do you advise mixing a small percentage of cylinder oil with the fuel and, if so, what proportion?

We do not believe that your engine would run satisfactorily, if at all, on kerosene, using an ordinary gasoline carburetor such as yours. You certainly could not start the engine cold on kerosene, and we fear that you would have serious lubrication difficulties due to the kerosene destroying the oil film on the cylinder walls, and thinning the oil in the oil reservoir in the engine base. It is doubtful if a heavier would overcome the adverse effects upon lubrication caused by kerosene in an unburned state leaking down past the piston. Oil fed in with the fuel tends to help the lubrication of the upper portions of the pistons, which often receive too little oil in the case of hot running engines. About one part in 20 is the greatest proportion of oil thus used and it is customary to use less.

AMPERES FOR IGNITION.

(J. B. W., Lynn, Mass.)

Kindly let me know how many amperes does a four-cylinder engine use for ignition purposes an hour; also how many amperes would you allow for the use of an electric horn?

It is impossible to answer these questions without knowing the make and type of ignition and horn. Most of the ignition systems require, for a four-cylinder engine, about one-half an ampere. The horns vary greatly, depending on the size and type, some consuming as much as eight or 10 amperes, others taking as little as two or three.

TIMING VALVES, ISOTTA-FRASCHINI BABY FOUR.

(J. G. T., Greenwich, Conn.)

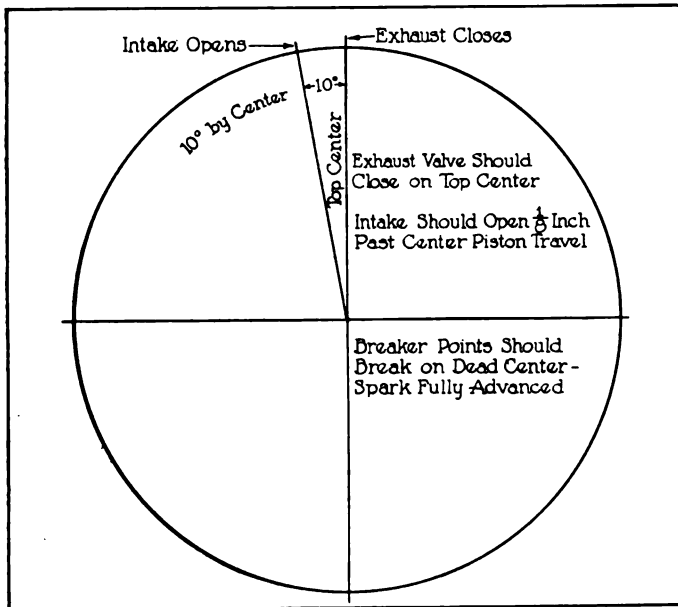
Would like to have you publish the exact valve timing diagram and instructions for timing a 1906 Isotta-Fraschini Baby Four. The bore of the engine cylinder is $2\frac{1}{4}$ inches and the stroke of the piston is four inches. The markings on the flywheel are as follows in direction of rotation: 0, 8, 30, 50. These, I believe, are degree markings, but I am in doubt as to which refer to the intake and which to the exhaust valves. I have had the engine running, but it heats up considerably. The magneto is set about $\frac{1}{2}$ inch before center.

You should have no difficulty in timing this engine if you insert a feeler wire either through the spark plug opening or the pet cock of No. 1 cylinder, so that the end of the wire rests on the head of the piston. A cork stopper, placed over the upper end of the wire, will prevent its slipping into the

(When Writing to Advertisers, Please Mention the Automobile Journal.)

cylinder. Turn the engine over by hand till the No. 1 piston comes to top dead center, determined by the wire as it rises with the piston. On the suction stroke the exhaust valve will be closed at 0 or top dead center, while the inlet valve will open about $\frac{1}{8}$ inch past center or between 10 and 12 degrees. remaining open till the piston has traveled down its stroke. past bottom center and is on its upward stroke at about 35 to 37 degrees past bottom center, at which point it should close. The exhaust valve opens about 46 degrees before bottom center, remaining open till the piston reaches top center again.

We would prefer to time from No. 1 cylinder and the remaining cylinders can be timed correctly from this one. You may find it advantageous to experiment a little with the



marks given on the flywheel, but we do not believe that they will give the results desired. The breaker points on the magneto should be set to break exactly at top dead center with the spark lever fully advanced.

The setting of the magneto that you mention, $\frac{1}{8}$ inch before center, will probably account for the engine overheating, as the engine will doubtless labor with the spark so far advanced. A later spark setting will probably correct this. Overheating may be caused by the cooling system being filled with rust and sediment, or the radiator may have been frozen at some time in the past and when it was repaired a section of the core may have been cut out, reducing the capacity of the water carried. Examine the radiator closely and note if this has been done. Clean out the cooling system with hot water and sal soda solution, dissolving one-half to a pound of sal soda in five gallons of hot water, filling the cooling system with this solution and operating the engine to circulate the solution for 20 minutes to half an hour; draw off the solution at the end of this period and fill with fresh water. If the cooling system is badly rusted this treatment may have to be repeated several times before all sediment and rust is removed. Removing the petcock at the bottom of the radiator will facilitate drawing out the solution and sediment.

CARBON REMOVAL, MARVEL CARBURETOR. (W. C. B., Washington, D. C.)

Kindly tell me how I can remove the carbon and oil accumulation from the water jacket and flexible connecting tube of the Marvel carburetor used on my model 43 _____ car.

Have tried kerosene, gasoline and one of the so-called carbon removers without success.

Remove the carburetor from the intake manifold of the engine, drain out the gasoline in the bowl and put the carburetor to soak in a can filled with kerosene. The carburetor should be left to soak over night, or for 24 hours according to the amount of carbon and oil deposit in the jacket. At the end of this period remove from the kerosene and blow out the remaining soft carbon with air pressure. This will usually clean it thoroughly.

(When Writing to Advertisers, Please Mention the Automobile Journal.)



NATIONAL ZIG ZAG RADIATOR

The Efficient Radiator
For Ford Cars

THE great value of National Zig Zag Radiators for Ford owners is in the fact that these radiators contribute so much towards the better operation of the car.

National Zig Zag Radiators are everywhere admitted to be "the most efficient radiator built per pound of metal"—and it is on this basis of better results that they are winning a greater and greater place in sales and demand.

They offer you greater water space, more cooling surface, and extreme contraction and expansion flexibility.

Scientifically constructed throughout National Zig Zag Radiators offer a maximum of efficiency at minimum trouble and expense.

NATIONAL CAN COMPANY

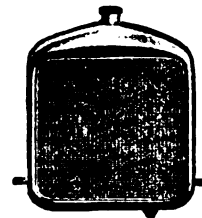
Detroit

Radiator Division

Michigan

Dealers

We are in position now to offer attractive agency propositions. Full information on request.



NATIONAL ZIG ZAG RADIATOR

Prices

F. O. B. New York \$28.00 finished in black enamel, \$30.00 finished in nickel. Shipping weight 35 pounds.

V. A. NIELSEN CO.

708 Beacon Street

Boston, Mass.

We Do Any Electrical Auto-Repairs

Immediate Return Reliable Work
Absolute Guarantee

Factory Depot for
Connecticut Ignition
Dealers' Parts List Ready

N. E. Distributors
Stokes Carburetor
Agents Wanted

MAY WE DO YOUR WORK

NEW DEPARTURE BALL BEARINGS

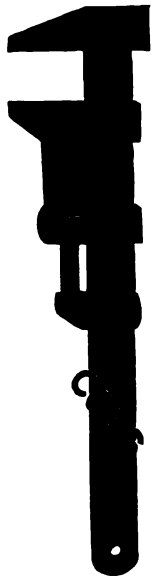


Strength
Stamina
Service



The New Departure Manufacturing Co., Bristol, Conn.
Conrad Patent Licensees

COES *The Standard* WRENCH



WRENCHES that are made for the hardest service. They do not break but grip and hold and their efficiency never lessens.

Economy tools as they last longer, give better service and never become useless through wear.

Utility wrenches of the highest order for car owners and repairers as they can be used in compact places and once set hold like a vise.

*The Best Wrench
The Cheapest*

All dealers carry in stock the exact size to meet your need. They recommend Coes Wrenches as all good dealers have for more than fifty years.

COES WRENCH COMPANY
WORCESTER, MASS.

ENJOY SMOOTH RIDING



by keeping your springs lubricated. Brown Oilers automatically filter oil between spring leaves, eliminate rust, stop squeaks and give you solid comfort.

Easily applied. Ask your dealer. Set of 8 oilers, \$10. Money back guarantee.

BROWN SPRING OILER CO.,
6913 Carnegie Ave., Cleveland, O.

PAIGE

The Most Beautiful Car in America

A complete line
of touring and
enclosed models.

Write for Literature.

Paige-Detroit Motor Car Co.

DETROIT, MICH.

RECTIFIER FOR CHARGING BATTERIES.

(V. H. C., Cincinnati, O.)

I have electric lights in my garage and should like to know what equipment is required to enable me to charge my storage battery from this source.

We presume that you have alternating current and if so you will need some form of rectifier to convert this current into direct and to reduce the voltage to the eight or 16 volts which your battery requires, depending on whether it consists of three or six cells. The rectifier is a handy, portable and almost automatic device, reasonable in price and conveniently connected to a lamp socket and to the battery to be charged, and you can do the charging at night when your car is not in use. Your local electric light company can doubtless supply you with any one of several forms of rectifier.

KNOCK IN ENGINE.

(A. E. V., Pawtucket, R. I.)

My engine develops a substantial knock when the spark is fully advanced, which stops only when the full retard is used. I do not think that this is caused by carbon deposits. What do you think can cause it?

Are you sure that the timer is set correctly upon its shaft? If it is set too greatly advanced you would not be able to run without a knock with the spark lever in its advanced position. We do not know the exact spark timing for your engine and ignition system but, as a general rule, the setting of the breaker points should be such that with the spark lever fully retarded they should be on the point of separation when the piston in the cylinder that is to fire is exactly at the top of its stroke. In case the setting is much earlier than this you would hardly expect to be able to use the full advance.

ENLARGING CYLINDERS.

(J. S. E., Hartford, Conn.)

In enlarging cylinders for oversize pistons, which do you recommend, grinding, reboring or lapping? It has been suggested that, in lapping, the emery used is likely to remain in the pores of the metal and cause scoring.

Probably grinding is the best process as being less liable to leave the bore distorted and should result in a very fine finish, but excellent results can be obtained by boring, if a first class outfit is used. Reaming also gives good satisfaction if the equipment and, especially the workmanship, are good. Lapping is used only to impart a smooth surface to the bore and to correct minute inaccuracies and not when the bore is to be enlarged appreciably. If reasonable care is used no trouble need be feared from the action of the abrasive embedded in the metal.

VALVE STEM CLEARANCE.

(C. L. H., Hagerstown, Pa.)

The instruction book accompanying my car states that the valve stem clearance should be not less than .004 inch and not over .008 inch. When I make the clearance a tight .005 inch, the valves are quiet, but the fuel economy is poor. If I allow .006-inch clearance I can get between 20 and 25 miles a gallon, but the valves are noisy. Should the valve stems be smoothed off with emery paper to make them slide easily in the guides? If a felt washer were placed on the valve stem below the guide, but inside the spring, would it reduce the noise of the valves seating?

Your low gasoline economy with the smaller clearance is due to the fact that it is insufficient to enable the valves to seat completely when the parts are hot. You may have to use the larger clearance and tolerate some noise. The stems should, of course, be smoothed enough to keep them just free in their guides. We doubt if the felt washer will reduce the noise to any extent, but it may be worth trying. Probably the noisy valve seating is a result of the design of the cams. The valve lift may be rather large and the springs of too great a tension.

(When Writing to Advertisers, Please Mention the Automobile Journal.)

BOUNDLESS POWER



Power, which might mean merely more speed in less capable hands, has become flexibility, responsiveness, comfort and safety in Pierce-Arrows. The ability to run on high gear from three to seventy-five miles an hour, and back, to overtake passing cars or ascend steep hills without shifting, means flexibility. To start from a standstill, and accelerate in one-fifth less time, is responsiveness. The quickness with which the car gets out of a tight place or shortens the time required to pass and overtake another car adds safety.

To its owner the Pierce-Arrow has boundless power because it has all the power he will ever be called upon to use.

THE PIERCE-ARROW MOTOR CAR COMPANY
Buffalo New York

PIERCE ARROW

DUAL VALVE SIX



What India Tires Mean for Motorists

INDIA Tires combine a certain snappy refinement in appearance with an outstanding display of rugged brute strength which marks a new standard of tire perfection.

They not only look better, but records prove convincingly that they wear better. Hence, they are lowest in cost per mile.

India Tires are built to represent and maintain a decisive leadership in tire performance. Their minimum mileage is maximum mileage for others.

For the motorists who use them, India Tires mean 100 per cent returns on their tire investment and a definite sense of security and freedom from ordinary tire trouble that only India Tires can furnish.

If your local dealer should not happen to sell Indias, write direct to the factory. We specialize on individual requirements in open territory.

The INDIA TIRE & RUBBER CO.
AKRON, OHIO

INDIA TIRES

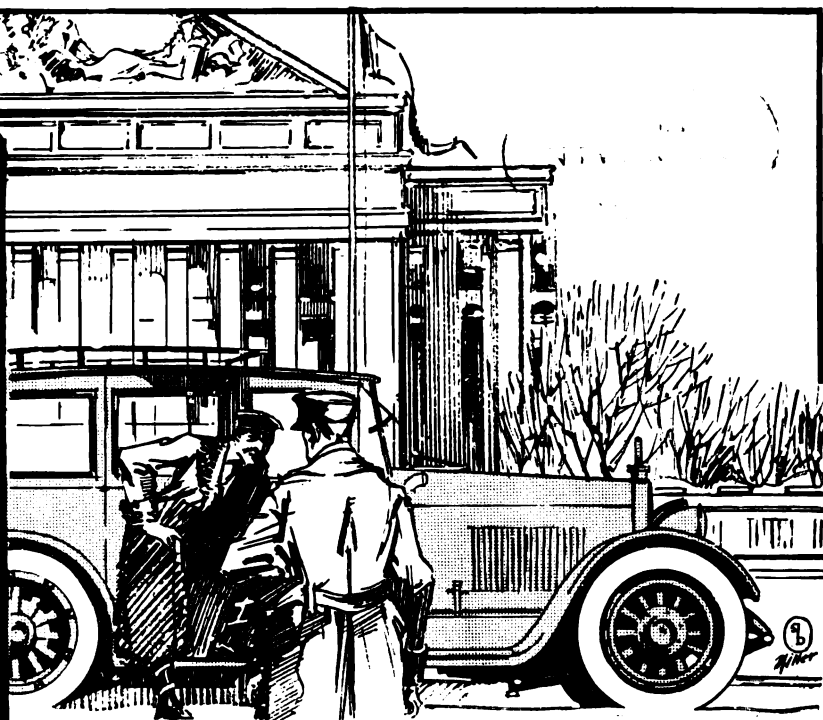
**"Mileage?
You said it"**

There's more honest-
to-goodness mileage
packed in every
gallon of Socony
Gasoline- more pep
punch and power
-than in any gas I
ever used. ~ ~

At filling time
look for the red,
white and blue
Socony Sign.



*"Every Gallon
the Same"*



SOCONY

REG. U.S. PAT. OFF.



**MOTOR
GASOLINE**

The sign of a reliable dealer
and the world's best Gasoline

STANDARD OIL COMPANY OF NEW YORK

Syra-Cord TIRES

*"Built by Cord
Tire Specialists"*

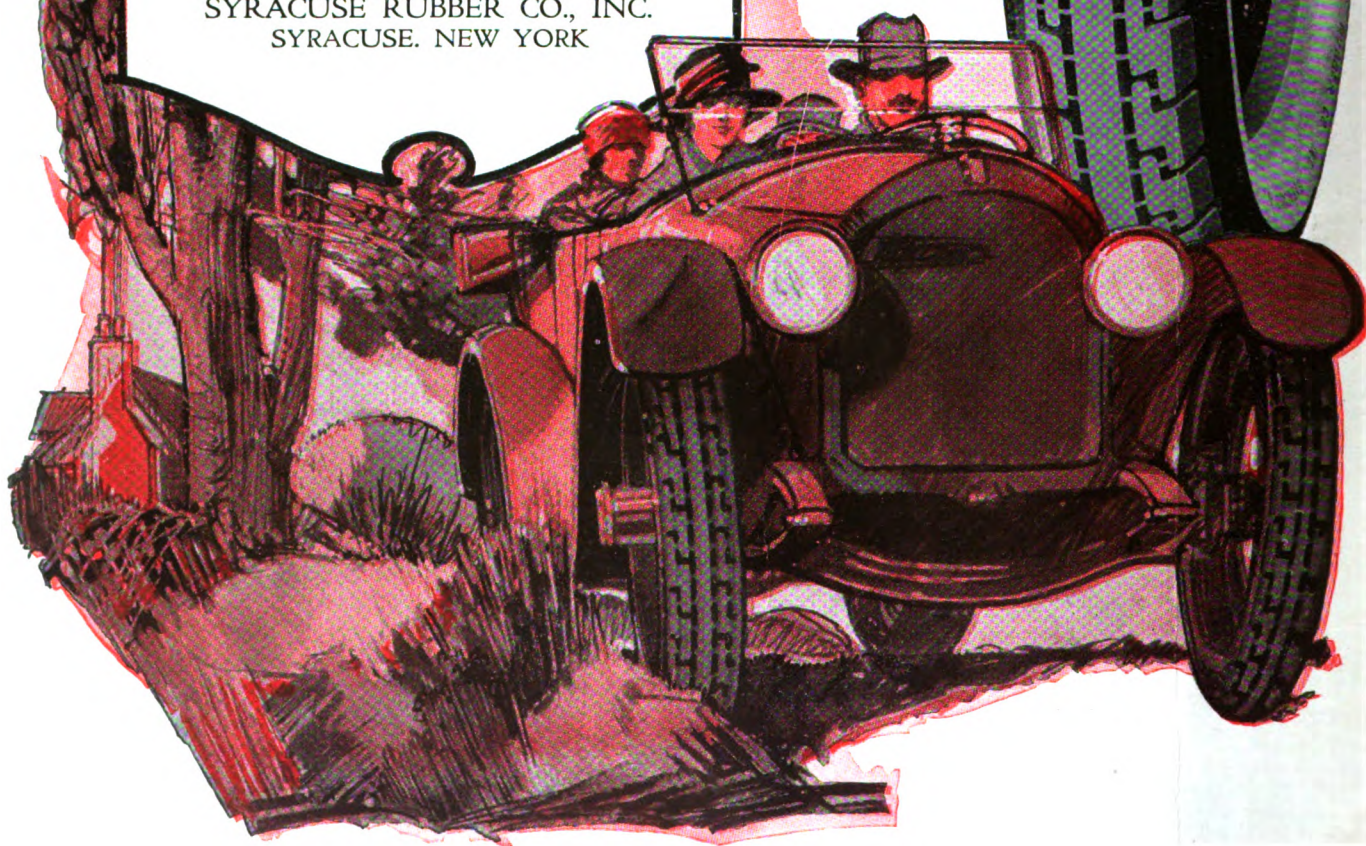
Not a Single Adjustment

Since Syra-Cord production began—early in 1920—thousands of Syra-Cords have been sold and used. Hundreds have already run thousands of miles, yet not a single tire has been returned for adjustment. The same careful choice of materials and methods that went into these first Syra-Cords, is being steadfastly maintained. This is a Syra-Cord pledge, made by a reliable business house. It is the best guarantee of quality.

To live dealers we offer what is without exception one of the best tire propositions in the market today. Territory is going fast. Write or wire.

Dept. D

SYRACUSE RUBBER CO., INC.
SYRACUSE, NEW YORK



Rides Like Velvet —Wears Like Iron



After all is said and done it is the actual performance of a tire on the car that counts.

A tire may *look* pretty when it is new but it is the mileage you get that makes it either a good or a bad investment.

Achilles Tires are made by tire experts for Service. Every step—every operation in the building of these tires, has but one object in view: **SERVICE.**

And yet Achilles Tires cost you no more—in fact they cost you less than most other tires when you finally figure the number of miles and excellent service you get out of them.

It will pay you well to investigate the Achilles Tire. Write us for name of nearest Achilles Dealer.

The Achilles Rubber & Tire Co. Inc.
Binghamton, New York

Dealers Note:

Increased manufacturing facilities enable us to add a few more Dealers to our list. If you can measure up to the Achilles standard we have an attractive proposition for you. Write for it.



Monthly 20c the Copy \$2 the Year



A Tractor Journal
devoted to the
tractor industry and trade



Published by
The Automobile Journal Publishing Company
PAWTUCKET, RHODE ISLAND

GREB AUTOMATIC GRIP PULLER

BEACH PATENT

A garage and repair shop necessity. Adjusts instantly, grips firmly and cannot unhook. As noted in illustration, it can be made into a two-arm puller. Also has three 12-inch arms opening to 18 inches. The



Grebe Automatic Grip Puller has many uses and will soon pay for itself. Ask your jobber or write for our Ten-Day Trial Proposition. You need this tool in your business.
No. 1 for.....wheels and large gears
No. 2 for.....magnetos and generators
No. 3 for.....average gears

THE GREB COMPANY
201 State Street, Boston, Mass.

METZ Master Six

The car of the Year

A New England Product

Honest through and through

\$2090 F. O. B. factory FULLY
EQUIPPED

We are now extending our agency list
Information at request

METZ SALES CORPORATION
BOSTON, MASS.

AUTOMOBILE JOURNAL

INDEX TO ADVERTISERS

	Page
Archilles Rubber & Tire Co., Inc., The.....	1
Auto Equipment Co.....	73
Auto Glare Remover Co., The.....	8
Barrett Co., The.....	67
Brightman Auto Exchange.....	75
Brown Retread Tire Co.....	80
Brown Spring Oiler Co.....	78
Coe's Wrench Co.....	78
Connecticut Auto Parts Co., Inc.....	73
Cormack Co.....	75
Cutter & Wood Supply Co.....	7
Detroit Magneto Exchange.....	75
Detroit Radiator & Specialty Co.....	75
Dort Motor Car Co.....	11
Eagle Oil and Supply Co.....	4-3
"Eck" Vapor & Primer Co.....	77
Empire Hotel.....	75
Fitzgerald Manufacturing Co.....	71
Flaherty, Wm. H. Co.....	75
Greb Co.....	2-80
Gulf Refining Co.....	12
Hoagland Co., Inc., C. W.....	79
Hotel Empire.....	75
Huffman Bros. Motor Co.....	13
Ideal Tire & Rubber Co.....	73
India Tire & Rubber Co.....	Cover
Lovejoy Mfg. Co.....	77
Magneto and Generator Exchange of N. E.....	75
Mets Sales Corporation.....	2
Motor Specialties Co.....	8
Morton & Brett.....	80
National Motor Car & Vehicle Corp.....	14
New Departure Manufacturing Co.....	80
New York and New Jersey Lubricant Co.....	76
Nielsen Co., V. A.....	10
Northwestern Chemical Co.....	16
Paige-Detroit Motor Car Co.....	80
Pettingell-Andrews Co.....	3
Pierce-Arrow Motor Car Co.....	80
Rubber City Clearing House.....	75
Seidl, John.....	75
Smith Glass Co., L. C.....	Cover
Standard Oil Co. of N. Y.....	Cover
Standard Waste & Rag Co.....	75
Startit Mfg. Co., The.....	77
Syracuse Rubber Co., Inc.....	Cover
Winther Motor Sales Corp.....	80
Wizard Products Co., Inc.....	9
Zenith Carburetor Co.....	79

(When Writing to Advertisers, Please Mention the Automobile Journal.)

Put your motor on its best behavior

GUARANTEED RELIEF FROM POOR FUEL AND CARBON TROUBLE

A little turn of the key in the dash control and the HUMISTAT automatically feeds to the fuel mixture the correct proportion of COOL WATER VAPOR—

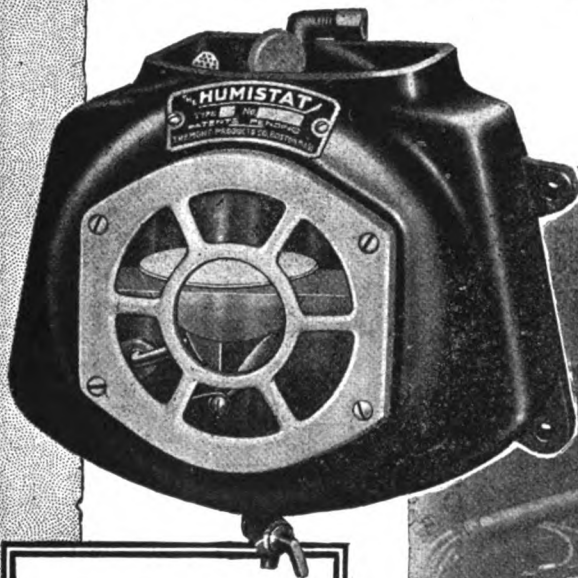
THE SECRET OF A PERFECT MIXTURE

the year round, hot weather and cold. This is the only form of moisture that can safely be fed to the cylinders, producing the extra pulling power, ready throttle response and increased motor efficiency of damp or foggy weather.

Send for Bulletin No. 5, which explains the Floating Air Sprayer, and how it keeps the motor smooth and powerful.

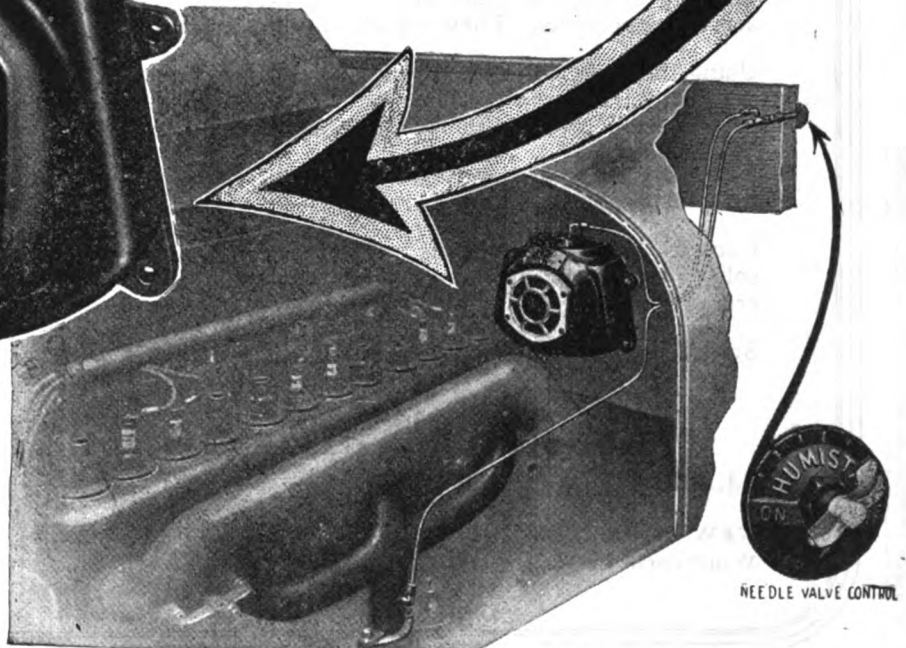
The Humistat

*"Kills Carbon Cares"
Saves Gasoline*



Dealers:

There is profit and prestige in the Humistat. Certain territories will be allotted. We invite inquiries.



Manufactured by
TREMONT PRODUCTS CO.
216 High Street, Boston, Mass.

New England Distributors—Automobile Division
PETTINGELL-ANDREWS COMPANY
100 Brookline Ave., Boston, Mass.

(When Writing to Advertisers, Please Mention the Automobile Journal.)

(REGISTERED)

EAGLEINE

MOTOR OIL

\$AVE\$

For years Eagleine Motor Oils have been used by car owners with complete satisfaction.

It has been proven in all kinds of service tests to be the cheapest oil to use. It lasts longer and carbonizes least.

It reduces operating costs, it lessens engine wear, it adds to the life of the car.

Eagleine Oils cost no more than other lubricants and are made in grades for every engine. They are highly specialized, their exceptional quality having been developed by years of refining experience and careful observation of service conditions. They are absolutely desirable and wholly dependable.

Using the right oil in an engine adds life and "pep" to it. Good lubrication is car insurance worth considering. If thoroughly lubricated the engine will be perfectly efficient and there will be little repair or upkeep expense.

These are some of the reasons why you should try Eagleine Oil. For other reasons write us.

Look for the Eagleine trade mark; it is on all containers in which the oils are sold. These containers are in sizes to meet all requirements. Sold by all dealers, or direct.

Start using Eagleine today and you will commence to save.

Eagle Oil and Supply Co.,

44-45-46 India St.

Boston, Mass.

NEW YORK CITY
Woolworth Building

CHICAGO
1132 W. 37th Street

(REGISTERED)

EAGLEINE

GEAR OIL

\$AVE\$

Worry ceases when you use Eagleine Gear Oil in the transmission and differential gearsets of your car.

You will know that every moving part will be protected until the last drop is exhausted.

Eagleine Gear Oil is a scientifically developed heavy lubricant for use in gears. It will flow in low temperature and will reach and fully lubricate all bearings and perfectly cushion the gears and prevent wear.

It is a 100% efficient oil. It is the most economical lubricant, for it will last much longer than a grease. The saving is in wear of parts, in upkeep and replacement cost, in repair bills, and in continuance of car service—all important items.

Eagleine Gear Oil is sold with the broadest guarantee of complete satisfaction, and to be the most economical and dependable lubricant for transmission and differential gearsets.

When buying specify the Eagleine brand, sold only in sealed containers, by all dealers or direct.

Eagle Oil and Supply Co.,

44-45-46 India St.,

Boston, Mass.

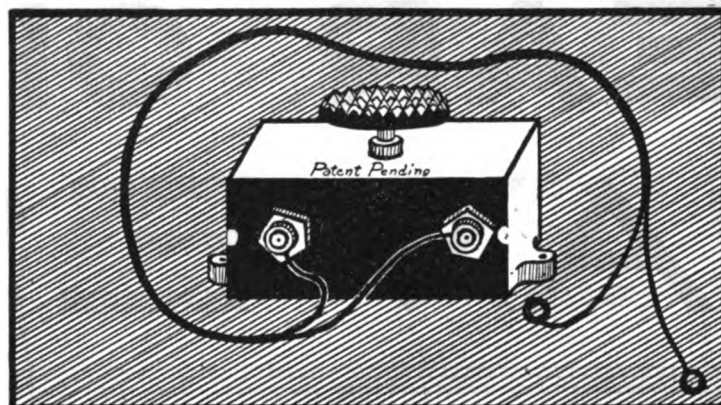
NEW YORK CITY
Woolworth Building

CHICAGO
1132 W. 37th Street

The Auto Headlight Glare Remover

A perfected practical 100% efficient device. Eliminates the danger of glaring lights and makes night driving safe—

Installed in Six minutes on any car by anyone. Order from your dealer or direct.



No wires to change. Nothing to get out of order. Will last as long as the car.

The Auto Headlight Glare Remover forms car insurance of the highest order. It protects the occupants, as well as the vehicle, against the usual danger of night driving.

It positively controls glaring headlights and it cannot fail to operate.

By pressing a conveniently located button on the floor board with your foot the glare is gone instantly. After passing when the pressure of the foot is removed full power of the lights are on at once.

The Auto Headlight Glare Remover can be used with any type of lenses. When driving through a city or town the button can be locked by giving it a slight twist with the foot and the lights will remain glareless until released.

A great percentage of all car accidents is due to glaring headlights. If patent lenses do not afford full safety then every car should be equipped with the Auto Headlight Glare Remover.

List Price \$3.50—Complete to Install

JOBBER—DEALERS—Garage men everywhere are placing this equipment in a big way. It sells on sight and it solves the problem of night driving. Our terms are extremely liberal. Write for them today.

**The Auto Glare Remover Co.
161 Massachusetts Ave.,**

Boston,

Mass.

better holes fewer dollars



Trade Mark Registered

"They've pulled me out of some bad holes."

They'll do the same for you. A complete set of Critchley Improved SUPER-SIX Expansion Reamers will ream any hole from $\frac{15}{32}$ " to $4\frac{1}{16}$ " as accurately as you can gage it with a "mike"

The unusually large range of expansion of SUPER-SIX Reamers makes them mighty handy for the repair shop.

The $\frac{15}{32}$ " SUPER-SIX, for instance, expands to $\frac{17}{32}$ ", while the $\frac{15}{16}$ " reamer has an expansion of $\frac{1}{8}$ of an inch. You can ream any hole from $\frac{15}{16}$ " to $1\frac{1}{16}$ " with just that one reamer.

Besides, SUPER-SIXES will expand — without forcing — from .010 to .015 of an inch over their rated maximum size, al-

lowing them to be reground again and again before new blades are needed.

This feature, together with the low first cost of the reamers, makes it worth your while in dollars and cents to look for the SUPER-SIX trade mark.

Cutter & Wood Supply Co.
62 PEARL STREET
BOSTON 9, MASS.

USE SUPER-SIX EXPANSION REAMERS

Proper grinding is absolutely necessary to insure the accuracy and cutting efficiency of a reamer. We shall be glad to send free upon request complete instructions and diagram for regrounding reamers. Just write and say, "Send me regrounding instructions and descriptive price list of Critchley Improved SUPER-SIX Expansion Reamers."

115-5

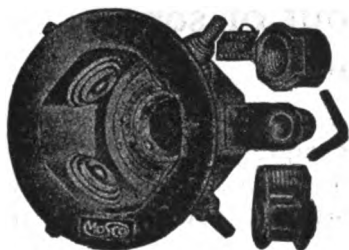
(When Writing to Advertisers, Please Mention the Automobile Journal.)

Automotive Equipment

HIGHEST QUALITY — ALWAYS

IMPROVED BEMUS BALL CONTACT TIMER

(for Ford Cars)



Starting Is Easier—Engine Runs Smoother—Ignition More Positive—Coil Points Are More Enduring—Car Life Is Longer.

The form of contact of the Improved Bemus Timer is electrically and mechanically correct. The hardened tool-steel brush contacts with steel balls retained by springs with plugs on the ends against the balls. The balls revolve when they contact with the brush—a changed surface for every contact, and the brush touches only these balls, each of which has its own track, so there is maximum wear and no possibility of short circuits from accumulations of worn fiber.

Price \$3.00

"TUWAY" COMBINATION DASH LAMP AND PLUG SOCKET

An equipment of handsome appearance that ornaments any car and will afford a greater distribution of light from the same candle power lamp than any other lamp made. With it is incorporated a socket into which trouble lamps, cigar lighter or any other electrical connection can be fitted, without changing the dash lamp. The switch is in the lamp bracket.

It is of brass, heavily nickel plated, and is complete with lamp, bolts, screws and nuts for installation. Specify whether single or double contact is required.

Price \$2.50



FLOATING PLUNGER WHEEL PULLER

A wonderfully efficient tool, built for either wood or wire wheels, that will free any "Frozen" or stuck wheel instantly from the axle shaft. Striking the plunger and turning the screw once or several times will remove the wheel without damage to the hub threads, the axle or the wheel.

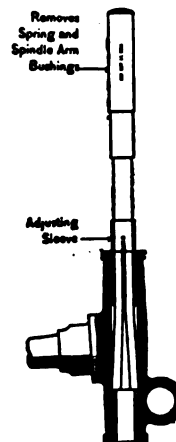
Made for 200 models of 45 makes of cars. A necessity in the service station, the repair shop or the private garage.

BUSHING REMOVER

A splendidly economical tool for general use on Ford, Dodge, Dort, Chevrolet, Saxon, Overland, Maxwell and all cars, trucks and tractors having 1/4-inch spindle bolts. With it bushings can be quickly removed from steering spindle bodies, spindle arms and spring eyes.

Made of tool steel, hardened and drawn to spring temper. Fitted with a sleeve that keeps the split end compressed until seated in the bore, when it automatically releases. It will save its cost in labor with the first work done.

Price \$1.50



MOTOR SPECIALTIES COMPANY

WALTHAM

Manufacturer

MASS. U. S. A.

Export Department, E. W. Lenz, Sales Mgr., 280 Broadway, New York, N. Y.

Automotive Equipment

(When Writing to Advertisers, Please Mention the Automobile Journal.)

WIZARD

Compels the "Gas" to Be Good

WIZARD ANALYSIS

When the gas is good—burns clean, 75% of motor troubles are eliminated. And "Wizard," backed by a hole-proof, iron-clad, money-back guarantee, compels the gas to be good. The theory is simple—the results are remarkable.

"Wizard" is a gas accelerator: a chemical kin to gasoline that attacks its physical properties and makes it less resistant to mixing with air.

"Wizard" converts poor quality gasoline into a powerful zippy combustion fuel and positively will not attack the motor, the carburetor, or other mechanism.



100
for
\$1.00

Your "Tour" Will Prove Its Value

"Wizard" stops and cures carbon troubles, also.

"Wizard" in the fuel tank—one tablet to each gallon—decreases fuel consumption and increases mile-ability materially.

Read our guarantee again—read it carefully—see how chemical analysis certifies "Wizard" as harmless to engine, etc. Prove "Wizard" to yourself—it can't cost you anything if it doesn't work satisfactorily—Then, be a "Wizard" booster. Remember!—"Wizard" in the fuel tank gives more miles, costs less gas—renews engine energy, and is usable for Car, Truck, Motor Boat, Tractor, and with Gasoline, Kerosene or Distillate.

There is but one "Wizard"—we make it. Write, and get acquainted with "Wizard," the great fuel tonic.

Under the most favorable conditions of cold weather "Wizard" insures more power, speed, perfect ignition, easier starting, quicker pickup, and a quicker acting motor. Get ready for the winter now.

WIZARD PRODUCTS CO., Inc.

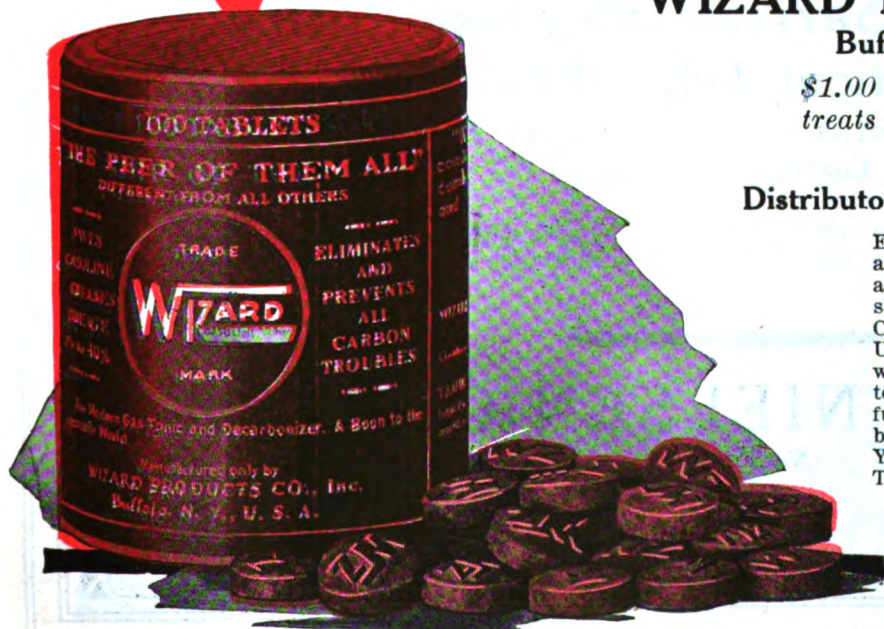
Buffalo, N. Y., U. S. A.

\$1.00 for box of 100 Tablets—
treats 100 Gallons of Gasoline.

Distributors, Attention!

Exclusive territorial arrangements available in some sections for HIGH CLASS DISTRIBUTORS, on a basis which permits them to build a successful and permanent business. SECURE YOUR TERRITORY NOW.

One
tablet
to each
gallon
of fuel
does the
trick



(When Writing to Advertisers, Please Mention the Automobile Journal.)

New Headquarters V. A. Nielsen Co.

To our thousands of patrons in the East, we announce removal to and the occupancy of an entire building, which has been adapted to our requirements and specially equipped to afford them the highest quality of service that can be given.

We extend a cordial invitation to all dealers and car owners to visit our plant.

The personal attention and liberal treatment of customers, with guarantee of all work to be wholly satisfactory, which has attracted and retained so large a patronage, are policies that will continue unchanged.

But we want to emphasize that we are now better equipped to serve and satisfy you.

New England Representative **Briggs & Stratton Co.**

Basco Switches Cut-Outs Regulators

L. F. Benton Co.
Benton Mica Spark Plugs

India Cable
Starting, Lighting and Ignition Cable

Factory & Service Representative

Connecticut Tel. & Elec. Co.
Ignition Apparatus Interior Telephones
Garage 'Phones

Centrally located, accessible from all parts of New England, with an admirably equipped shop manned by skilled workers, we are prepared to undertake any work and make deliveries on scheduled time.

V. A. NIELSEN CO.

(New Address)

701 Beacon St.,

Boston 17, Mass.



DORT

Quality Goes Clear Through

Quite naturally when you think of the Dort it is in the terms of warm esteem with which it is regarded in your particular community.

And yet there is a larger aspect to the great goodwill that surrounds the name Dort.

What is true of your community is true also of the country at large.

Throughout the length and breadth of the land people are saying the same good things about the Dort with the same quiet sincerity.

It is, in the aggregate, nothing less than a national recognition of the measurably superior qualities of this car.

And it is based solidly upon the demonstrated ability of the Dort to perform unusually long and loyally at a remarkably low operative cost.

PRICES

Touring Car.....	\$1085
Roadster	1085
Fourseason Sedan.....	1765
Fourseason Coupe.....	1765

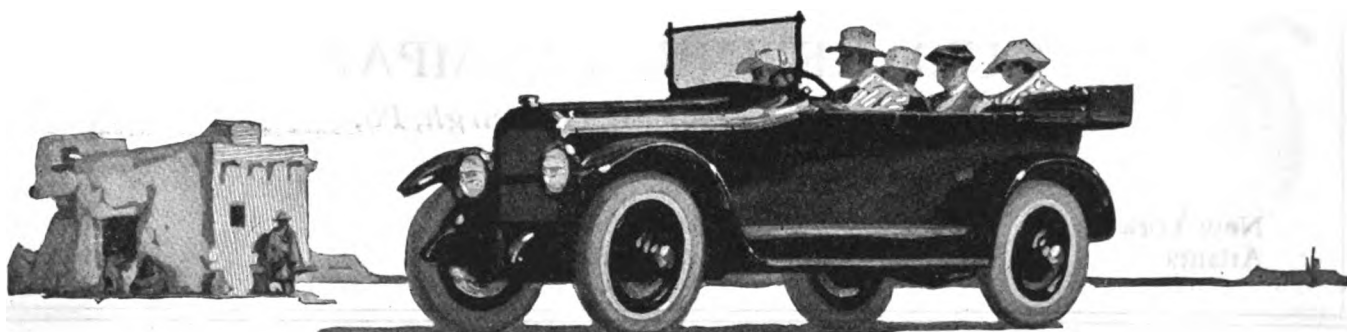
F. O. B. Factory

Wire wheels and spare tires extra

234

DORT MOTOR
CAR COMPANY

Flint Mich.



(When Writing to Advertisers, Please Mention the Automobile Journal.)



S U P R E M A C Y

SUPREME AUTO OIL has been manufactured under the same conditions and in the same manner for years—it is therefore uniform. Today it is the choice of more than a million motorists. Its value as a lubricant for automobiles is established.

Further than this, it possesses a "less carbon" feature found in few other oils. It leaves less carbon in the cylinders, as it contains no paraffine to form a sticky gum on piston head and cylinder walls which collects and holds the free carbon.

For the same reason "It Flows Freely At Zero"—a very necessary feature for Winter driving.

Dealers find repeat sales the result of making it a leader.

Write us.

GULF REFINING COMPANY

General Sales Offices: Pittsburgh, Pa.

District Sales Offices:

**New York
Atlanta**

**Philadelphia
New Orleans**

**Boston
Houston**

(When Writing to Advertisers, Please Mention the Automobile Journal.)

THE SUCCESS of the DEALER

Without the successful dealer no factory organization can be a success. So, with the Huffman organization "Factory Co-operation" is more than a mere phrase—it is a vital living force which has enabled us to secure many desirable dealers whose success is indissolubly linked with ours. We want more of the right kind of dealers—are you one?



The specifications and illustration prove that the Huffman Six is the much sought after type of "family car." Where can you buy a car of the Huffman class at anywhere near the Huffman price—a car with a Continental Motor—a Borg & Beck clutch—Covert transmission—Hardy flexible disc universals and other high grade standardized parts, together with the complete equipment and refinements found only on the higher price cars?

Write or wire today for dealer proposition.

SPECIFICATIONS

Motor—Continental 6-cylinder, $3\frac{1}{4} \times 4\frac{1}{4}$.
Transmission—Covert—three speed selective type integral with motor.
Clutch—Borg & Beck 10 inch, 10 spline.
Lubrication—Combined force feed and splash.
Cooling—Centrifugal pump.
Springs—Front, 87", semi-elliptic Clemens. steel bushings fitted with oil cups and

wicks; Rear, 56", bottom leaf special alloy steel.
Axles—Front I-beam; rear full floating and spiral gear driven.
Tires—32"x4" straight side, non-skid on rear.
Wheelbase—120 inches.
Carburetor—Stromberg.

Dyneto—2-unit, 6-volt, starting and lighting system. Willard battery. Connecticut ignition.
Propeller Shaft Universals—Hardy flexible discs eliminate universal joint trouble and require no lubrication.
Weight—2,680 pounds.
Price—\$1995—f. o. b. Elkhart, Indiana.

ADDITIONAL REFINEMENTS THAT PROVE THE CAR'S COMPLETENESS.

Regular tailor made, actual one-man top.
Genuine leather straight plaited upholstery.
Inlaid Inoleum covered running boards and floor boards.
Stewart-Warner speedometer.
Accurate gasoline gauge on tank.
12-ft. extension trouble lamp cord from in-

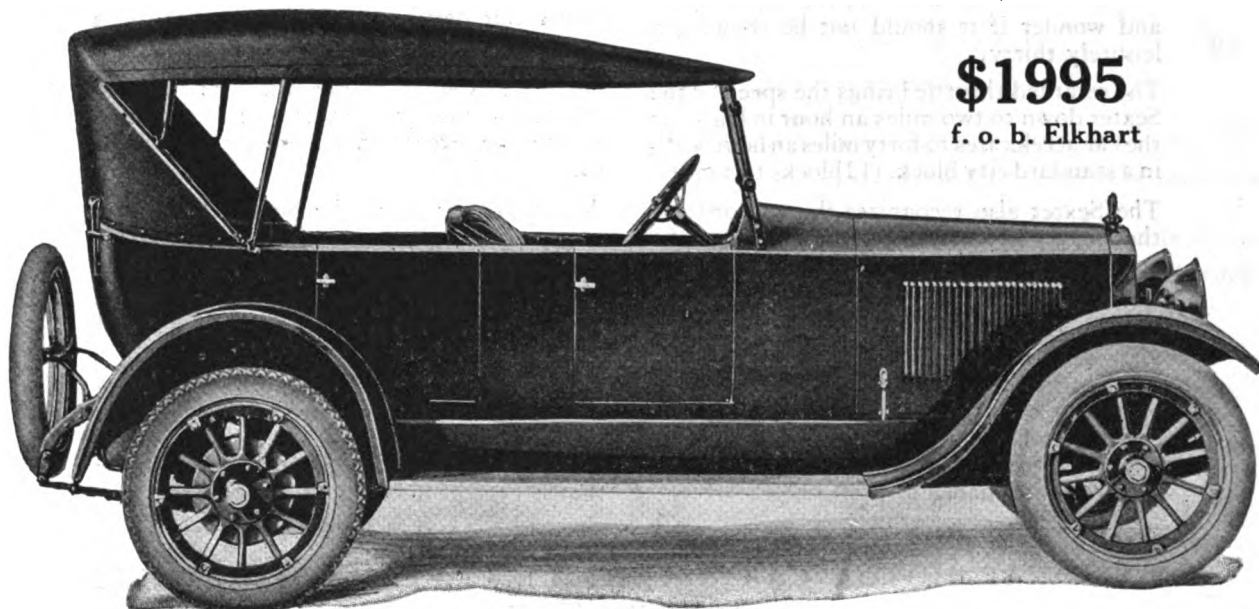
strument board light.
Three-way tonneau light.
Rigid tire carrier on rear.
Automatic shut-off ignition switch.
Double ventilating windshield.
Robe rail on back of front seat.
Large pocket in front doors and rear of

front seat.
Complete set of good tools, jack and pump.
Motometer on radiator cap.
10x24" plate glass rear curtain window.
Side curtains open with doors.
Colors—Foch Gray, Victory Blue, Huffman Maroon.

Huffman Brothers Motor Co.

Factory, Elkhart, Indiana
Makers of the Huffman Truck

Showroom
2425 Michigan Ave.
Chicago



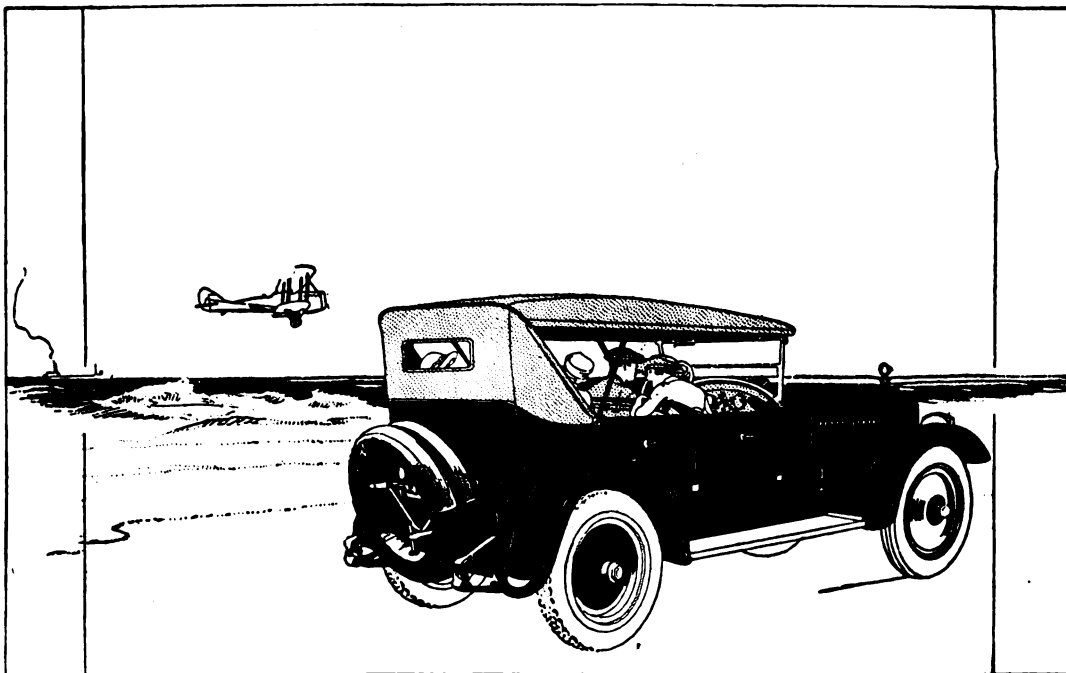
\$1995

f. o. b. Elkhart

(When Writing to Advertisers, Please Mention the Automobile Journal.)

National

Built in Five Custom Body Modes



THE NATIONAL SEXTET SEVEN-PASSENGER TOURING

Speed So Smooth *that Miles Melt Away*

Sixty miles an hour is an effortless speed for the new National Sextet.

So smoothly and masterfully does the car hit this road racing gait that you are tempted to question the accuracy of the speedometer and wonder if it should not be showing a leisurely thirty.

The retarded throttle brings the speed of the Sextet down to two miles an hour in high, yet the car accelerates to forty miles an hour within a standard city block. (12 blocks to a mile.)

The Sextet also recognizes the authority of the brake, as well as the command of the accelerator, coming to a full stop from forty miles an hour in less than nine car lengths.

Utmost ease of handling is a salient Sextet virtue. The car obeys the slightest touch of hand and foot. The steering is of the freely operating worm-and-gear type. Brake and clutch pedals yield easily to pressure. Control levers are exceptionally long, and operated without change of posture.

Lift the long tapering hood of the National Sextet and you will see the source of the car's extraordinary road competence. It is an improved overhead-valve, high-efficiency, six-cylinder engine, built complete in National shops and developing 71 horsepower, with only $3\frac{1}{2}$ x $5\frac{1}{4}$ inches bore and stroke.

Only the experienced eye will note the correctness of design that makes the Sextet engine the exceptionally efficient piece of mechanism that it is.

And only a visit to the National factories can disclose the close limits to which this engine is built and the advanced methods of precision manufacture that are practiced by expert craftsmen in translating this design into steel and its alloys.

Yet even the novice, when he takes the wheel, instantly appreciates the advantages of these qualities which are responsible for the abundant, smooth, silent, flexible power that is ever at his bidding and control.

NATIONAL MOTOR CAR & VEHICLE CORP., INDIANAPOLIS

Twentieth Successful Year

(When Writing to Advertisers, Please Mention the Automobile Journal.)

AUTOMOBILE JOURNAL

INDEX TO CONTENTS

Published Monthly by the
AUTOMOBILE JOURNAL PUB. CO.
Times Building, Pawtucket, R. I.

WILLIAM H. BLACK.....Treasurer
DAVID O. BLACK.....Secretary

Branch Offices: New York City, Chicago, Detroit,
Boston, St. Louis, Cleveland.

SUBSCRIPTIONS:

United States and Mexico (Postage Paid) the year \$1.50
Canada\$2.50
Foreign Countries in Postal Union.....\$3.50
The Copy.....20 Cents

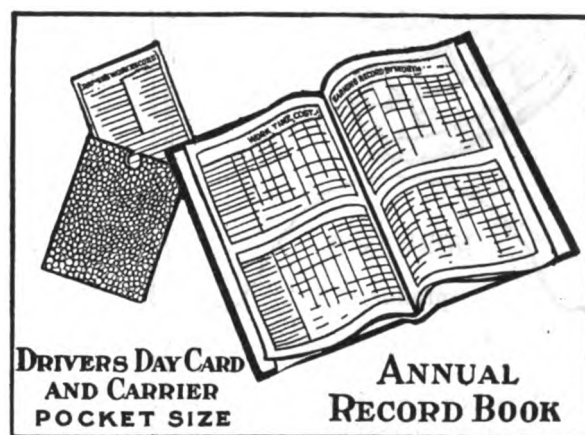
PRINCIPAL FEATURES OF CONTENTS.

	Page
*Annual Touring Number—Introduction.....	17
*Transcontinental Routes.....	18
*Lincoln Highway Itinerary.....	18
*Yellowstone Trail Itinerary.....	20
*Pike's Peak Highway Itinerary.....	21
*National Old Trails Itinerary.....	22
*Dixie Highway Itinerary.....	24
*New England and Atlantic Coast—Map.....	25
*Touring New England.....	26
*Maine, New Hampshire and Vermont, Map..	27
*New England Routes.....	28
*Massachusetts—Map.....	28
*Rhode Island and Connecticut—Map.....	29
*New York State Map Showing Empire Tours.	34
*Adirondack Trail Itinerary.....	36
*Onondaga Trail Itinerary.....	38
*Iroquois Trail Itinerary.....	39
*General Map of Transcontinental Routes..	40-41
*New Jersey—Map.....	42
General Index.....	43
*Pennsylvania Routes (with State Map)....	49
*Delaware and Maryland—Map.....	53
*Thorough Inspection of Car Needed Before Starting on Tour.....	54
*Proper Adjustment of Clutch Is Important..	57
*Hints on Selection of Camp Site and Spare Equipment.....	61
*Accessories for the Tourist.....	64
*How to Meet Driving Emergencies.....	68
Motorists Making Own Repairs.....	69
*Tuning Up the Electrical System and Adjust- ing Carburetor.....	70

*Indicates Article Is Illustrated.

Know what it costs to Run your Truck
Learn what your Truck Earns
Know your Truck Profit and Loss

UNIVERSAL MOTOR TRUCK ACCOUNTING SYSTEM



The system includes an annual record book, 350 drivers' day cards, a day card carrier and full instructions.

Any Owner can start this system at any time with an old or new truck of any make or type.

Any boy or girl clerk can maintain all records for one or a hundred trucks.

Each system is good for one year, nothing more is needed or necessary.

The records show at a glance any and all items entering into the earnings and cost of operation.

It is extremely simple. 100% complete and full working instructions are supplied with each system.

It is almost self-operating.

Price \$10 — Delivered

Address Record Department

MOTOR TRUCK

Pawtucket,

Rhode Island.



NORWESCO

products

for every need

Leather Top & Upholstery Dressing
 Mohair Dressing & Lining Dye
 Utility Black, retouching enamel
 Valve Grinding Compound
 Skalex, the radiator cleaner
 Neatsfoot Clutch and Brake Compound
 Rim and Gasket Shellac
 Carbonox, the carbon remover
 Never Burn, engine enamel
 Iron Cement
 Color Varnishes
 Rim Graphite Coating

—All—

Guaranteed

On the Other Side of the Counter

Assume, for a moment, that you are a motorist—on the customer's side of the counter. You ask for a good radiator repairer. The dealer shows you one brand at \$1.25 per can and another—at 75 cents. Which would *you* buy—the inexpensive brand being *guaranteed* to do as much and as good work as the larger and higher priced can? Why, you'd just naturally hand the dealer 75 cents, of course!

That's the SE-MENT-OL argument exactly! That's why thousands of dealers who used to carry several brands of radiator preparations now concentrate on the 75 cent can of

SE-MENT-OL

(LIQUID AND POWDER)

the *original*, self-acting radiator repairer.

One 75 cent can of SE-MENT-OL is enough for even the largest cooling system. This means a quicker turnover—more profit, with a smaller investment—and you give the motorist the best value for his money.

SE-MENT-OL is *guaranteed* to repair quickly and *permanently* cooling system leaks. SE-MENT-OL Liquid kept in the radiator, will keep the cooling system leak-proof for the life of the car.

Better get acquainted with NORWESCO products—they are the best-selling chemical goods on the market.

Write today for dealer's proposition and discounts.

The Northwestern Chemical Co.

727 State St.,

Marietta, Ohio.

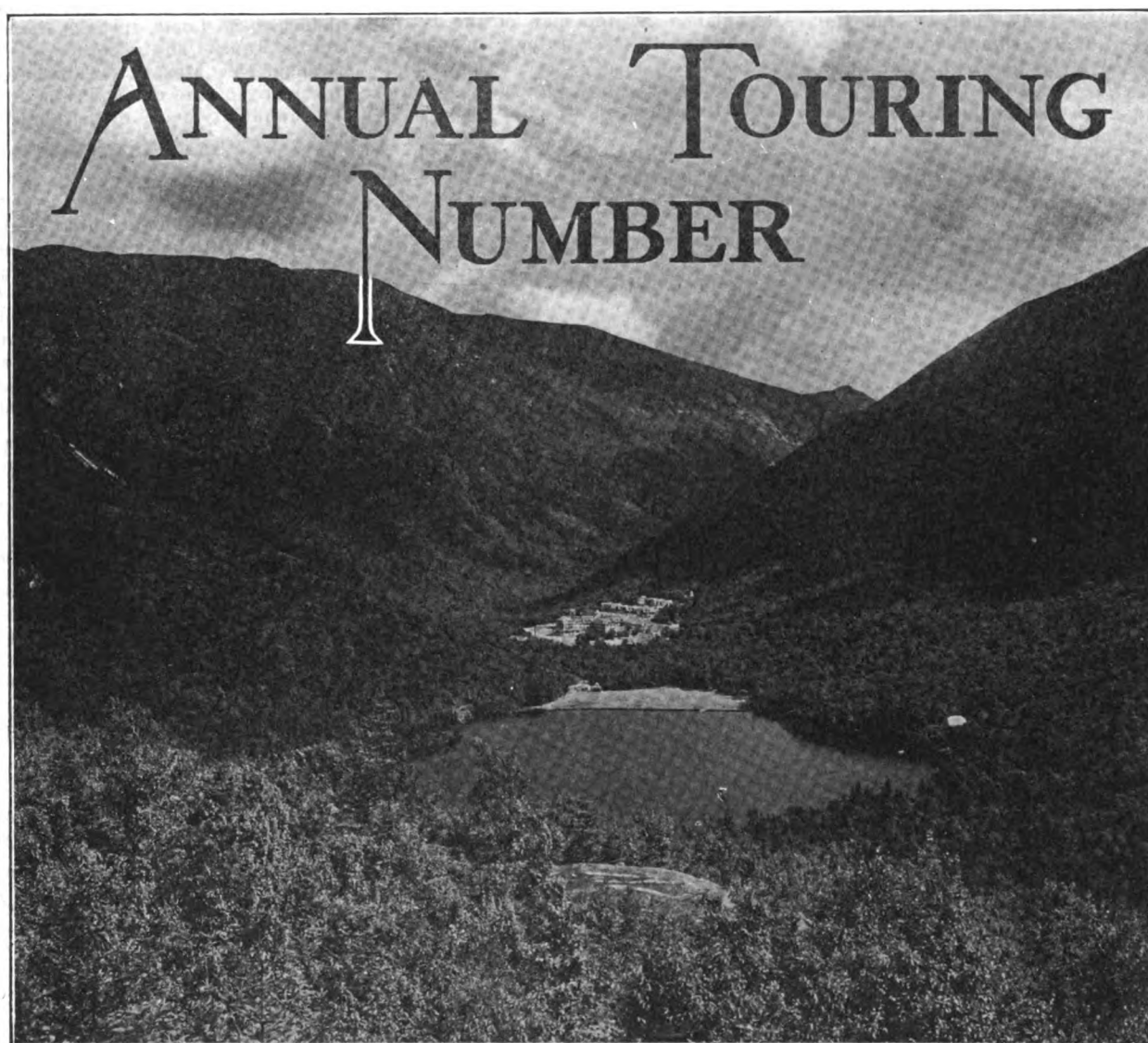
Canadian Factory: Montreal

THE AUTOMOBILE JOURNAL

VOL. LXVII.

PAWTUCKET, R. I., JULY, 1920.

NO. 12.



IN THIS 14th Annual Touring Number, the Automobile Journal aims to present in a simple, compact and accessible form, itineraries and touring maps showing the principal transcontinental routes, as well as the Dixie Highway, the great main route connecting Chicago and the Middle West with Jacksonville and the south Atlantic sea board. New England, New York, New Jersey, Pennsylvania, Delaware and Maryland are especially featured, as well as the Great National Park region of the West, as affording the most attractive sections for summer touring.

It is also probable that there will be

more touring this season than ever before along the Canadian border and among the picturesque beauty spots of our northern neighbor, and some new itineraries are included in this Touring Number to cover that section.

There is also included a comprehensive article giving directions as to the systematic and thorough overhaul of the car before starting en tour, as well as pertinent information in regard to camping, selection of equipment, etc.

It is safe to say that never before have the prospects for enjoyable touring been so alluring as this season in America. Roads are being put in better condition

with each passing year, and preparations in all sections for the entertainment of tourists, catering to their comfort and pleasure, are reported as more elaborate than ever before.

With the conditions for touring in the foreign field still far from satisfactory, the opportunities for loyal Americans to enjoy the beauties and become familiar with the marvels of their own country are still unsurpassed. No other continent in the world offers, for the pleasure of the tourist in so accessible a form, such diversity of scenic, climatic and topographic conditions, as does America with its unparalleled coast line and mountains.

The Transcontinental Routes

THE present-day motor tourist, who desires to cross the country, is given the option of a number of main highways traversing nearly every part of the country. Chief among these are the Lincoln highway, the Yellowstone trail, the Pike's Peak highway and the National Old Trails, complete itineraries of which are given herewith, and these routes may be traced on the accompanying large map, together with several other optional transcontinental and meridional routes.

An itinerary of the Dixie highway is also provided, which affords the most

tured by the land of wonders through which it passes, including the world-famous Yosemite valley, the Yellowstone National park, the Grand Canon of the Colorado, Glacier, Sequoia and Mt. Rainier national parks, etc.

A glance at the map of the United States reveals the strategic importance of the Pike's Peak Ocean-to-Ocean highway as a main trunk line in a system of national highways, whether constructed for social, commercial or military purposes. It crosses the continent midway between the northern and southern tier of states, following generally the 40th

through the Cumberland mountains, perhaps the most picturesque part of the entire trip. It crosses the pan-handle of West Virginia into the valley of the Ohio river and then into the State of Ohio, touching Zanesville and Columbus; thence to St. Louis, through Kansas City, across Kansas and a corner of Colorado through New Mexico to Santa Fe, following many of the old trails made famous by the mighty deeds of the pioneers.

ITINERARY.

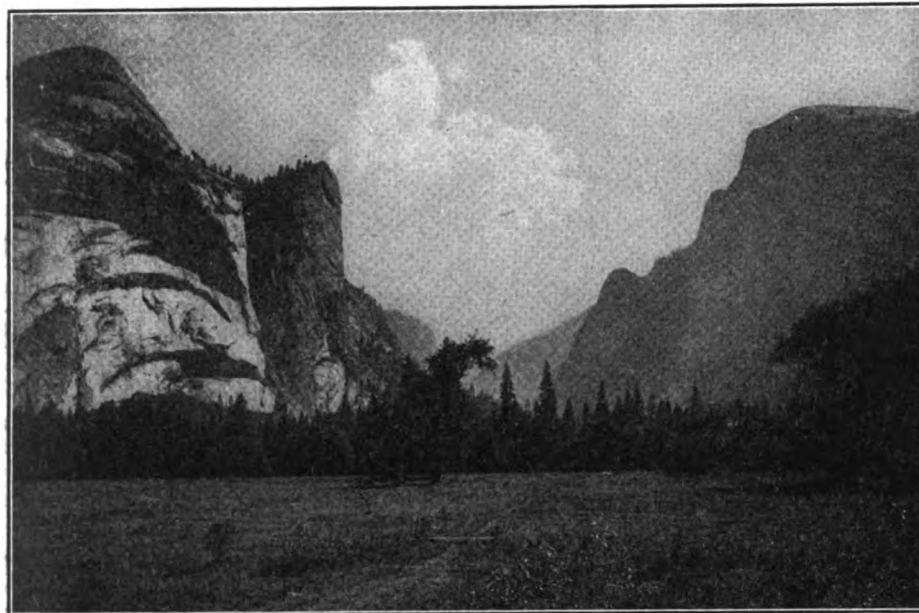
Night Stops—Philadelphia, Gettysburg, Bedford, Pittsburgh, Pa.; Canton, Lima, O.; South Bend, Ind.; Chicago, Ill.; Clinton, Marshalltown, Ia.; Omaha, Kearney, Neb.; Julesburg, Denver, Col.; Cheyenne, Rawlins, Green River, Wyo.; Salt Lake City, Kearney's Ranch, Utah; Ely, Austin, Reno, Nev.; Sacramento, San Francisco, Cal.

NEW YORK-PHILADELPHIA.

	Miles		Miles
New York.....	0.0	Franklin Park.	41.8
Weehawken		Kingston	48.3
(via ferry)...	3.7	Princeton	51.5
Jersey City.....	8.0	Lawrenceville..	54.4
Newark.....	12.3	Trenton	62.5
Elizabeth.....	17.1	Oxford Valley.	68.7
Rahway.....	23.0	Glen Lake.....	70.6
Iselin.....	27.0	Langhorne.....	71.6
Menlo Park.....	28.0	La Trippe.....	76.6
Metuchen.....	29.8	Busieton.....	81.7
New Brunswick	35.1	Philadelphia...	93.6
Highland Park.	36.4		

PHILADELPHIA-PITTSBURGH.

	Miles		Miles
Philadelphia...	0.0	W. Fayetteville	137.4
Overbrook.....	6.4	Chambersburg.	141.1
Ardmore.....	8.4	St. Thomas....	148.5
Bryn Mawr.....	9.7	Fort Loudon....	154.5
Wayne.....	14.1	McConnellab'g.	162.6
Berwyn.....	17.1	Harrisoville...	169.0
Paoli.....	20.4	Breesevood.....	180.5
Whiteford.....	20.4	Everett.....	188.9
Dowington.....	32.5	Mt. Dallas.....	190.6
Thorndale Sta'm	34.6	Bedford.....	197.8
Coatesville.....	38.8	Wolfsburg.....	200.5
Sadsburyville..	42.8	Schellsburg.....	207.1
Mt. Vernon.....	47.0	Buckstown.....	218.8
Gap.....	49.5	Kanter P. O....	222.8
Kinners.....	51.8	Stoyestown....	223.8
Leaman Place..	55.2	Farrilton.....	229.8
Paradise.....	56.7	Jenners.....	230.3
Soudersburg...	60.7	Jennerstown..	231.3
Lancaster.....	65.0	Laughlintown.	239.8
Mountville.....	71.4	Ligonier.....	243.1
Columbia.....	75.1	Youngstown...	251.7
Wrightsville...	76.9	Greensburg....	261.6
York.....	88.0	Grapeville....	265.7



The Domes in Yosemite National Park.

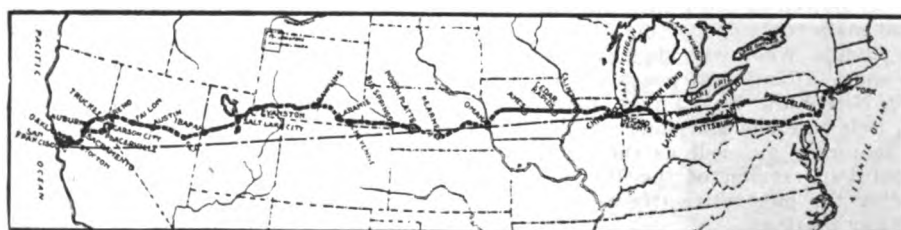
convenient and interesting over-land route from Chicago to Jacksonville, Fla., on the south Atlantic sea coast, encircling the great state of Michigan, tapping the rich industrial centers of Illinois, Indiana and Ohio, and terminating in Florida, the land of flowers and perpetual summer, and communicating with the famous winter resorts of that region.

The Lincoln highway, which in many respects is perhaps the result of one of the most stupendous programmes of road building ever known, passes through 11 and connects 12 states on its way from the world's metropolis to the renowned Golden Gate of the Pacific. Much of it passes through or near places closely associated with the history and development of the Union. Its distance is 3322 miles, and the usual pleasure party, with easy driving and only a nominal amount of sight-seeing en route, can make the trip in 20 to 30 days, driving approximately 10 hours a day, or at an average rate of 18 miles an hour.

The Yellowstone trail is, of course, fea-

parallel of latitude. It is a wonderful scenic route and follows historic trails. It links 12 states, passing through six state capitals. It traverses 97 counties and touches 500 cities, towns, villages and hamlets, serving in them and adjoining territory a total population of nearly 25,000,000. The distance from New York City to San Francisco is 3564 miles.

The National Old Trails swings somewhat to the south of the other itineraries. The eastern section is rich in historical interest and the tourist may visit scenes of important events of the Revolutionary and Civil wars. It next passes



The Lincoln Highway.

Abbotstown.....	102.9	Adamsburg.....	268.4
New Oxford.....	116.6	Irwin.....	271.2
Seven Stars.....	120.5	Jacksonville.....	272.5
McKnight's.....	122.4	E. McKeesport.....	278.7
Cashtown.....	124.3	Turtle Creek.....	281.0
Crawfordsburg.....	129.2	E. Pittsburgh.....	282.1
Calendonia Pk.....	131.2	Wilkinsburg.....	284.9
Fayetteville.....	135.6	Pittsburgh.....	282.2

PITTSBURGH-FORT WAYNE.

Miles		Miles	
Pittsburgh.....	0.0	Massillon.....	109.5
Bellevue.....	5.8	W. Brookfield.....	111.6
Avalon.....	6.6	E. Greenville.....	113.9
Glenfield.....	10.4	Dalton.....	118.6
Sewickley.....	17.2	East Union.....	124.8
Fairoaks.....	18.5	Wooster.....	130.8
Ambridge.....	21.0	Jefferson.....	134.8
Economy.....	21.8	New Pittsburgh.....	140.2
Baden.....	25.0	Rowsburg.....	143.5
Conway.....	26.4	Ashland.....	150.7
Freedom.....	28.2	Mansfield.....	164.2
Rochester.....	30.1	Ontario.....	171.0
Bridgewater.....	30.8	Gallion.....	179.2
Beaver.....	31.4	Bucyrus.....	193.0
Eather.....	41.7	Nevada.....	201.0
Ohioville.....	43.0	Up. Sandusky.....	209.0
Smith's Ferry.....	46.0	Forest.....	222.2
E. Liverpool.....	50.6	Dunkirk.....	230.1
Lisbon.....	66.4	Dola.....	233.9
Hanoverton.....	75.9	Ada.....	240.6
Kensington.....	77.0	Lima.....	258.5
E. Rochester.....	81.7	Gomer.....	268.1
Minerva.....	85.7	Delphos.....	276.4
Robertsville.....	91.5	Van Wert.....	289.2
Osamburg.....	97.0	Fort Wayne.....	321.9
Canton.....	101.8		

Marion.....	51.5	Vall.....	302.3
Cedar Rapids.....	56.7	Denison.....	311.2
Belle Plaine.....	122.2	Arion.....	319.1
Chelsea.....	129.0	Dow City.....	321.8
Gladstone.....	135.8	Dunlap.....	329.9
Tama.....	140.0	Woodbine.....	341.4
Montour.....	148.3	Logan.....	352.0
Le Grand.....	152.5	Missouri Val.....	360.7
Marshalltown.....	162.2	Loveland.....	365.0
LaMoille.....	169.0	Honey Creek.....	369.8
State Centre.....	176.3	Crescent.....	375.6
Colo.....	183.7	Council Bluffs.....	383.1
Nevada.....	190.7	Omaha.....	387.7

OMAHA-CHEYENNE.

Miles		Miles	
Omaha.....	0.0	Gothenburg.....	259.3
Elkhorn.....	16.2	Brady.....	272.4
Waterloo.....	19.5	Maxwell.....	281.3
Valley.....	23.0	North Platte.....	293.9
Fremont.....	34.9	Hersey.....	307.0
Ames.....	42.8	Sutherland.....	314.4
North Bend.....	50.9	Paxon.....	327.4
Rogers.....	58.1	Roscoe.....	339.7
Schuyler.....	66.5	Ogallala.....	347.1
Richland P. O.....	74.9	Brule.....	357.5
Columbus.....	83.1	Megenth.....	362.2
Duncan.....	92.3	Big Springs.....	365.0
Silver Creek.....	102.5	Chappell.....	368.8
Clarks.....	112.6	Lodge Pole.....	399.1
Central City.....	124.5	Sunol.....	406.9
Chapman.....	134.7	Sidney.....	417.1
Grand Island.....	147.5	Brownson.....	426.2
Alda.....	155.3	Potter.....	435.6
Wood River.....	164.8	Dix Station.....	444.6
Shelton.....	174.0	Kimball.....	454.1
Gibbon.....	180.0	Bushnell.....	466.0

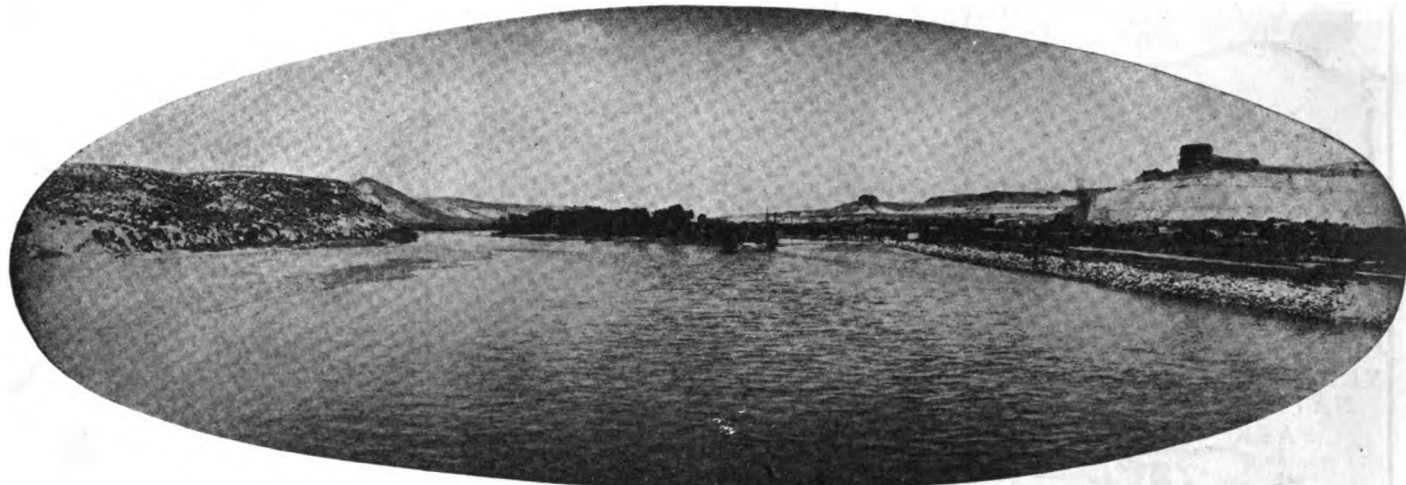
Pleasant Green.....	15.0	County Well.....	104.2
Ragtown.....	16.1	Fish Springs.....	146.3
Garfield.....	20.3	Callao.....	166.6
Inake Point.....	28.1	Ibapath.....	192.2
Milltown.....	30.3	Tippett.....	215.3
Grantsville.....	40.3	Anderson's R'h.....	237.3
Timple Point.....	54.3	Shellbourne.....	244.9
Iosepa.....	70.2	Magnuson's R'h.....	264.9
Brown's Ranch.....	77.3	McGill.....	273.6
Indian Ranch.....	79.3	East Ely.....	285.4
Indian Farm.....	84.3	Ely.....	288.4

ELY-RENO.

Miles		Miles	
Ely.....	0.0	Austin Summit.....	151.9
Lune.....	2.4	Austin.....	154.0
Copper Flat.....	6.9	New Pass Can- yon.....	181.5
Relpetown.....	8.0	Alpine Ranch.....	199.7
Kimberly.....	8.7	Eastgate.....	214.3
Jake's Summit.....	16.2	Westgate.....	224.1
Moorem's R'h.....	30.7	Mountain Well.....	249.3
Rosevear's R'h.....	32.7	Stillwater.....	264.2
White Pine.....	38.7	Fallon.....	278.7
Summit.....	44.2	Hasen.....	295.6
Hamilton.....	50.0	Fernley.....	308.1
Six Mile House.....	54.0	Wadsworth.....	311.3
14 Mile House.....	69.8	Derby.....	316.8
Pinto House.....	76.4	Vista Station.....	338.6
Eureka.....	83.6	Sparks.....	342.5
Rigley Ranch.....	96.9	Grimes' Ranch.....	347.8

RENO-SAN FRANCISCO.

Miles		Miles	
Reno.....	0.0	Roseville.....	123.0



Lincoln Highway Near Green River, Wyoming. Sweetwater County. Green River and Castle Rock on the Right. A Western Waterway.

FORT WAYNE-CLINTON.

Miles		Miles	
Fort Wayne.....	0.0	Chic. Heights.....	154.9
Churubusco.....	13.6	New Lenox.....	172.0
Merriam.....	22.6	Joliet.....	178.1
Wolf Lake.....	25.6	Plainfield.....	187.7
Kimball.....	30.4	Aurora.....	200.7
Ligonier.....	36.4	Moonsheart.....	205.6
Benton.....	46.7	Batavia.....	209.6
Goshen.....	53.8	Geneva.....	212.6
Elkhart.....	62.0	De Kalb.....	234.9
Osceola.....	68.0	Malta.....	239.9
Mishawaka.....	72.1	Creston.....	245.6
South Bend.....	76.1	Rochelle.....	251.7
New Carlisle.....	91.7	Ashton.....	263.1
La Porte.....	103.7	Franklin Grove.....	267.7
Westville.....	116.5	Dixon.....	277.0
Valparaiso.....	126.5	Sterling.....	290.2
Deep River.....	134.5	Morrison.....	304.9
Merrillville.....	141.5	Fulton.....	316.4
Schererville.....	147.3	Clinton.....	319.7
Dyer.....	150.3		

CLINTON-OMAHA.

Miles		Miles	
Clinton.....	0.0	Ames.....	197.6
DeWitt.....	19.5	Ontario.....	199.3
Grand Mount.....	25.0	Jordan.....	207.9
Calamus.....	31.0	Boone.....	213.7
Wheatland.....	35.2	Ogden.....	223.3
Lowden.....	41.2	Grand Junction.....	235.3
Clarence.....	49.7	Jefferson.....	243.6
Stanwood.....	54.4	Seranton.....	253.6
Mechanicville.....	60.0	Gildden.....	265.1
Lisbon.....	66.9	Carroll.....	284.1
Mt. Vernon.....	68.6	West Side.....	296.4

Kearney.....	192.7	Pine Bluffs.....	476.0
Odessa.....	201.8	Egbert.....	486.1
Elm Creek.....	206.7	Burus.....	492.6
Overton.....	217.9	Hillsdale.....	500.4
Lexington.....	229.1	Archer.....	511.8
Conad.....	247.1	Cheyenne.....	520.8

CHEYENNE-SALT LAKE CITY.

Miles		Miles	
Cheyenne.....	0.0	Latham Station.....	212.2
Corlett Station.....	5.7	Wamsutter.....	220.2
Borle Tower.....	9.3	Tipton Station.....	236.5
Otto Station.....	14.2	Point of Rocks.....	265.2
Granite Canyon Station.....	18.7	Trayer Junct'n.....	272.5
Buford.....	27.2	Rock Springs.....	281.7
Sherman Hill.....	32.8	Green River.....	296.5
The Siding.....	39.2	Bryan Station.....	300.8
Laramie.....	57.0	Granger Junct'n.....	325.6
Boiler.....	70.4	Lyman.....	354.2
Lookout.....	85.1	Ft. Bridger.....	359.8
Harper.....	90.6	Evanston.....	395.2
Rock River.....	96.8	Wyata Station.....	398.2
Medicine Bow.....	116.8	Wasatch.....	405.1
Carbon.....	127.0	Castle Rock.....	413.4
Evanville.....	135.3	Emory Station.....	420.3
Hanna.....	139.5	Main Forks.....	429.3
Walcott.....	155.5	Coalville.....	441.2
Ft. Steele.....	163.1	Hoytville.....	444.3
Lakota.....	169.6	Wanship.....	449.1
Granville.....	173.4	Kinball's R'nch.....	459.1
Rawlins.....	178.7	Roach's Ranch.....	460.2
Creston Station.....	208.2	Salt Lake City.....	483.5

SALT LAKE CITY-ELY.

Miles		Miles	
Salt Lake City.....	0.0	Orr's Ranch.....	87.3

Verdi.....	10.7	Sacramento.....	139.7
Truckee.....	32.7	Elk Grove.....	152.7
Donner.....	37.7	McConnell.....	157.7
Emigrant Gap.....	62.7	Arno.....	159.7
Dutch Flat or Alta.....	75.8	Galt.....	165.7
Gold Run.....	79.0	Woodbridge.....	173.7
Colfax.....	89.0	Stockton.....	187.7
Wyman.....	92.2	French Camp.....	192.8
Applegate.....	95.0	Banta.....	204.4
Auburn.....	104.5	Altamont.....	221.9
New Castle.....	109.3	Tracy.....	208.1
Pearyn.....	112.6	Livermore.....	239.7
Loomis.....	114.4	Hayward.....	257.2
Rocklin.....	117.0	Oakland.....	263.9
		San Francisco.....	267.9

RENO-SACRAMENTO.

Miles		Miles	
Reno.....	0.0	Sportsman's Hall.....	106.6
Steam'b't Spgs.....	10.1	Camino.....	110.9
Washoe.....	15.1	Placerville.....	117.6
Franktown.....	20.1	Eldorado.....	125.0
Carson City.....	31.7	Shingle Springs.....	129.9
Glenbrook.....	47.1	Clarksville.....	137.5
Cave Rock.....	50.1	White Rock.....	141.0
Edgewood.....	56.7	Folsom.....	147.1
Lakeside Park.....	57.8	Natoma.....	148.3
Meyers.....	65.7	Mills.....	157.1
Sierra Nevada Summit.....	68.9	Mayhew.....	160.0
Phillips.....	71.4	Manlove.....	161.1
Strawberry.....	76.1	Perkins.....	163.2
Kybur.....	85.8	Sacramento.....	168.4
Riverton.....	85.3		

Yellowstone Trail

ITINERARY. YELLOWSTONE TRAIL.

Night Stops—Plymouth, Mass.; Hartford, Conn.; Poughkeepsie, Binghamton, N. Y.; Youngstown, O.; Fort Wayne, Ind.; Chicago, Ill.; Milwaukee, Wis.; Minneapolis, Minn.; Milbank, Selby, S. D.; Terry, Custer, Livingston, Butte, Missoula, Mont.; Spokane, Walla Walla, Tacoma, Wash. Twenty Days, 3946.4 Miles.

Plymouth-Providence.

Miles	Miles
Plymouth..... 0.0	E. Providence.. 42.8
Middleboro..... 14.7	Providence..... 43.8
Taunton..... 25.8	



Providence-Hartford.

Miles	Miles
Providence..... 0.0	Willimantle..... 56.0
Chepachet..... 15.4	Andover..... 65.3
Pomfret..... 32.1	Hartford..... 84.0

Hartford-Danbury.

Miles	Miles
Hartford..... 0.0	N. Milford..... 38.9
Plainville..... 13.8	Brookfield..... 61.7
Bantam..... 38.2	Danbury..... 69.0

Danbury-Poughkeepsie, N. Y.

Miles	Miles
Danbury..... 0.0	Stormville..... 27.8
Mill Plain..... 3.9	Fishkill P..... 34.1
Brewster, N. Y. 10.0	N. Hackensack. 37.7
Carmel..... 14.5	Poughkeepsie. 45.1

Poughkeepsie-Kingston, N. Y.

Miles	Miles
Poughkeepsie.. 0.0	Rhinecliff..... 18.5
Hyde Park..... 6.1	Rondout F..... 18.6
Rhinebeck..... 16.2	Kingston..... 22.0

Kingston-Binghamton.

Miles	Miles
Kingston..... 0.0	Afton..... 126.3
Arkville..... 57.8	Ninevah..... 131.6

Delgo..... 83.3	Belden..... 136.0
Unadilla..... 109.9	Sanitary Spa.. 142.6
Bainbridge..... 120.4	Binghamton... 153.7

Binghamton-Elmira.

Miles	Miles
Binghamton... 0.0	Waverly..... 45.0
Owego..... 24.3	Lowman..... 55.6
Smithboro..... 35.2	Elmira..... 63.6

Elmira-Salamanca.

Miles	Miles
Elmira..... 0.0	Almond..... 67.1
Corning..... 18.6	Alfred Sta..... 70.8
Addison..... 30.2	Andover..... 79.8
Cameron..... 43.2	Bolivar..... 101.9
Canisteo..... 56.5	Salamanca..... 134.2
Hornell..... 61.8	

Salamanca, N. Y.-Youngstown, O.

Miles	Miles
Salamanca..... 0.0	Mercer..... 168.0
Warren..... 65.0	Youngstown... 210.0
Franklin..... 128.0	

Youngstown-Akron, O.

Miles	Miles
Youngstown... 0.0	Ravenna..... 32.6
Edinburg..... 25.0	Akron..... 50.0

Akron-Ft. Wayne, Ind.

Miles	Miles
Akron..... 0.0	Ottawa..... 147.8
Oberlin..... 46.7	Du Pont..... 162.8
Bellevue..... 83.0	Paulding..... 174.0
Portoria..... 118.8	Ft. Wayne..... 218.0

Ft. Wayne-Chicago.

Miles	Miles
Ft. Wayne..... 0.0	Valparaiso..... 119.2
Columbia City. 20.5	East Chicago.. 146.2
Warsaw..... 42.9	Hammond..... 149.2
Plymouth..... 72.5	Chicago..... 170.2

Chicago-Milwaukee.

Miles	Miles
Chicago..... 0.0	Kenosha..... 62.3
Evansston..... 13.1	Racine..... 73.0
Highland Pk... 26.0	S. Milwaukee... 87.0
Waukegan..... 46.5	Milwaukee..... 96.4

Milwaukee-Minneapolis.

Miles	Miles
Milwaukee..... 0.0	Stanley..... 229.0
Fond du Lac... 62.0	Eau Claire..... 259.5
Oshkosh..... 81.0	St. Paul..... 358.7
Stevens Pt.... 140.3	Minneapolis... 368.7

Minneapolis-Milbank.

Miles	Miles
Excelsior..... 0.0	Sacred Heart... 122.0
Waconia..... 31.1	Granite Falls.. 131.9
Brownston..... 67.9	Ortonville..... 205.4
Hector..... 86.9	Milbank..... 219.9

Milbank-Selby.

Miles	Miles
Milbank..... 0.0	Ipswich..... 127.0
Webster..... 45.0	Bowdle..... 157.0
Aberdeen..... 97.0	Selby..... 180.0

Selby-Hettinger.

Miles	Miles
Selby..... 0.0	McIntosh..... 110.5
Mohrbridge..... 35.0	Hettinger..... 197.5

Hettinger-Terry.

Miles	Miles
Hettinger..... 0.0	Baker..... 158.5
Rowman..... 72.0	Terry..... 260.5
Martin..... 115.5	

Terry-Custer.

Miles	Miles
Terry..... 0.0	Forsyth..... 90.9
Miles City..... 39.3	Custer..... 142.6

Custer-Livingston.

Miles	Miles
Custer..... 0.0	Reed Point..... 124.7
Billings..... 57.7	Livingston..... 185.5

Livingstone-Butte.

Miles	Miles
Livingston..... 0.0	Whitehall..... 106.1
Bozeman..... 26.7	Butte..... 139.2
Three Forks... 61.5	

Butte-Drummond.

Miles	Miles
Butte..... 0.0	Garrison..... 63.8
Anaconda..... 25.8	Drummond..... 86.6
Deer Lodge..... 52.3	

Drummond-Wallace.

Miles	Miles
Drummond..... 0.0	Missoula..... 58.1
Bearmount..... 13.5	Wallace..... 181.5

Wallace-Spokane.

Miles	Miles
Wallace..... 0.0	Coeur D'Alene.. 52.3
Kellogg..... 11.6	Spokane..... 86.0

Spokane-Walla Walla.

Miles	Miles
Spokane..... 0.0	Dayton..... 143.5



Colfax..... 80.2	Walla Walla... 176.4
Pomeroy..... 115.0	

Walla Walla-North Yakima.

Miles	Miles
Walla Walla... 0.0	Prosser..... 75.0
Sudbury..... 7.0	Grandview..... 91.0
Divide..... 26.0	Yakima..... 127.0
Walla Walla... 29.0	North Yakima.. 132.0
Kennewick..... 45.0	
Klona..... 63.0	

North Yakima-Cle Elum.

Miles	Miles
North Yakima.. 0.0	Thorp..... 53.0
Pomona..... 9.0	Teamway..... 65.0
Wenas..... 27.0	South Cle Elum 69.0
Ellensburg... 41.0	Cle Elum..... 72.0

Cle Elum-Tacoma.

Miles	Miles
Cle Elum..... 0.0	Isaquak..... 90.0
Nelson..... 16.0	South Park..... 109.0
Laconia..... 43.0	Seattle..... 114.0
Edgewick..... 61.0	Christopher... 146.0
Fall City..... 79.0	Tacoma..... 154.0

Pike's Peak Highway

ITINERARY.

PIKE'S PEAK HIGHWAY.

Night Stops—New York; Reading, Altoona, Pittsburgh, Pa.; Columbus, O.; Indianapolis, Ind.; Decatur, Quincy, Ill.; Brookfield, Mo.; Belleville, Norton, Kan.; Burlington, Colorado Springs, Leadville, Glenwood Springs, Rangely, Col.; Colton, Salt Lake City, Snowville, Utah; Wells, Battle Mountain, Lovelock, Nev.; Truckee, Sacramento, San Francisco, Cal. Twenty-Five Days, 3594.2 Miles.

New York-Reading.

Miles	Miles
New York..... 0.0	Easton 75.9
Newark 10.6	Bethlehem 87.4
Morristown 30.2	Allentown 93.1
German Valley 47.4	Kutztown 111.0
Washington 62.0	Reading 128.3

Reading-Altoona.

Miles	Miles
Reading 0.0	Newport 79.9
Stouchsburg 17.0	Mexico 97.4
Lebanon 27.8	Lewistown 112.0
Hummelstown 43.9	Belleville 127.6
Harrisburg 53.4	Alexandria 155.1
Clark's Ferry 67.9	Altoona 190.1

Altoona-Pittsburgh.

Miles	Miles
Altoona 0.0	N. Alexandria 66.6
Holidaysburg 7.0	Delmont 74.5
Summit 17.4	Wilkinsburg 92.7
Clyde 47.5	Pittsburgh 99.7

Pittsburgh-Columbus.

Miles	Miles
Pittsburgh 0.0	N. Cornerstown 112.1
Florence 24.4	Franklin 130.6
Holiday Cove 36.7	Dresden 141.7
Steubenville 44.7	Newark 163.1
Cadiz 65.8	Columbus 179.1
Uhrichsville 87.0	Columbia C. 183.1

Columbus-Indianapolis.

Miles	Miles
Columbus 0.0	Richmond 110.1
Brighton 30.2	Germantown 124.3
Springfield 44.1	Ogden 142.0
Fairfield 57.0	Greenfield 155.2
Dayton 68.1	Cumberland 168.6
Eaton 93.1	Indianapolis 179.0

Indianapolis-Decatur.

Miles	Miles
Indianapolis 0.0	Chrisman 85.3
Danville 19.7	Newman 103.5
Bainbridge 35.9	Tuscola 122.4
Rockville 59.1	Hammond 141.2
Moatesuma 67.7	Decatur 164.8

Decatur-Quincy.

Miles	Miles
Decatur 0.0	Beardstown 100.9
Buffalo 25.2	Rushville 114.0
Springfield 40.8	Mt. Sterling 131.7
Berlin 55.9	Clayton 144.5
Jacksonville 73.4	Camp Point 150.6
Concord 84.6	Quincy 174.7

Quincy-Brookfield.

Miles	Miles
Quincy 0.0	Clarence 79.1
Hannibal 18.7	Macon City 91.7
Monroe City 45.7	Bucklin 120.1
Shelbina 66.0	Brookfield 131.3

Brookfield-St. Joseph.

Miles	Miles
Brookfield 0.0	Hamilton 57.3
Wheeling 18.4	Cameron 72.4
Chillicothe 29.0	St. Joseph 107.4

St. Joseph-Belleville.

Miles	Miles
St. Joseph 0.0	Seneca 85.8
Troy 14.8	Beattie 113.0
Highland 35.2	Marysville 121.1
Hiawatha 49.5	Washington 148.0
Sabetha 65.0	Belleville 165.5

Belleville-Norton.

Miles	Miles
Belleville 0.0	Kensington 79.3
Courtland 16.7	Phillipsburg 95.5
Mankato 34.0	Prairie View 113.5
Smith Center 65.2	Norton 138.0

Norton-Burlington.

Miles	Miles
Norton 0.0	Colby 96.3
Dellvale 21.5	Brewster 115.0
Jennings 40.2	Goodland 133.3
Seiden 63.3	Burlington 163.7

Colton-Salt Lake City.

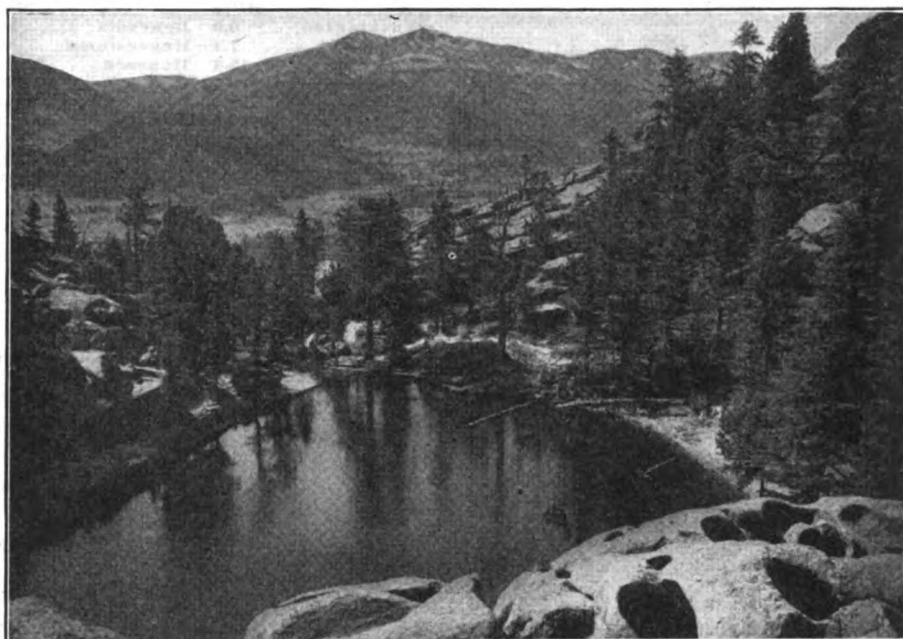
Miles	Miles
Colton 0.0	Provo 57.9
Thistle 33.7	Alpine 71.5
Spanish Forks 47.0	Salt Lake City 103.1

Salt Lake City-Snowville.

Miles	Miles
Salt Lake City 0.0	Honeyville 73.9
Ogden 37.9	Blind Springs 89.8
Brigham City 60.1	Snowville 117.3

Snowville-Wells.

Miles	Miles
Snowville 0.0	Montello 111.6
Lucia 94.2	Wells 166.2



Rocky Mountain National Park.

Burlington-Colorado Springs.

Miles	Miles
Burlington 0.0	Limon 83.9
Stratton 18.4	Mattison 105.5
Selbert 34.7	Calhan 127.8
Arriba 58.7	Falcon 149.1
Genoa 70.6	Colorado Spr'gs 168.6

Colorado Springs-Leadville.

Miles	Miles
Colorado Spr'gs 0.0	Bath 75.3
Edlowe 20.6	Buena Vista 93.5
Pulveto 48.1	Granite 111.1
Hartsel 63.5	Leadville 135.2

Leadville-Glenwood Springs.

Miles	Miles
Leadville 0.0	Wolcott 48.3
Pando 16.0	Gypsum 65.4
Redcliff 22.6	Glenwd. Springs 90.8

Glenwood Springs-Rangely.

Miles	Miles
Glenwd Springs 0.0	Meeker 75.9
Rifle 33.4	Rangely 136.9

Rangely-Colton.

Miles	Miles
Rangely 0.0	Roosevelt 89.7
K Ranch 22.0	Duchenne 121.9
Vernal 67.3	Colton 172.5

Wells-Battle Mountain.

Miles	Miles
Wells 0.0	Carlin 79.6
Deeth 20.5	Richmond Mine 96.9
Elko 56.4	Battle Mtn 133.0

Battle Mountain-Lovelock.

Miles	Miles
Battle Mtn 0.0	Mill City 85.6
Golconda 40.0	Humboldt 99.2
Winnemucca 57.0	Lovelock 132.4

Lovelock-Truckee.

Miles	Miles
Lovelock 0.0	Verdi 119.7
Wadsworth 75.8	Truckee 143.1
Reno 107.8	

Truckee-Sacramento.

Miles	Miles
Truckee 0.0	Auburn 76.5
Emigrant Gap 32.6	Folsom 95.6
Colfax 58.5	Sacramento 117.4

Sacramento-San Francisco.

Miles	Miles
Sacramento 0.0	Livermore 95.1
Lodi 24.6	Oakland 130.7
Stockton 52.4	San Francisco 136.2

National Old Trails

ITINERARY.

NATIONAL OLD TRAILS ROAD.

Night Stops—New York City, Philadelphia, Washington, D. C.; Cumberland, Md.; Wheeling, W. Va.; Columbus, O.; Indianapolis, Terre Haute, Ind.; St. Louis, Columbus, Mo.; Kansas City, Emporia, Hutchinson, Dodge City, Syracuse, Kan.; La Junta, Trinidad, Col.; Las Vegas, Santa Fe, Albuquerque, McCarty's, Gallup, N. M.; Holbrook, Flagstaff, Kingman, Ariz.; Amboy, San Bernadino, Los Angeles, Santa Barbara, Pasa Robles, Santa Cruz, San Francisco, Cal. Thirty-one Days, 3726 Miles.

New York-Philadelphia.

Miles		Miles
New York..... 0.0	Monmouth Jet.	46.8
Jersey City.... 6.3	Trenton	63.4
Newark	Oxford Valley.	70.0
Elizabeth	Hulmeville	73.6
Rahway	Andalusia	78.9

Iselin	27.4	Torrendale	81.1
Metuchen	31.4	Holmesburg ...	83.4
New Brunswick	36.0	Philadelphia ..	95.6

Philadelphia-Washington.

	Miles		Miles
Philadelphia ..	0.0	Perryville	60.9
Darby	6.3	Webster	66.0
Glendolen	8.2	Churchville ...	70.5
Norwood	9.3	Belair	76.3
Eddystone	12.5	Kingsville	83.5
Chester	13.6	Carney	89.7
Marcus Hook..	18.5	Baltimore	109.4
Claymount	20.1	Elkridge	109.4
Holly Oak	21.2	Laurel	121.4
Wilmington ..	26.4	Contee	123.4
Elsemere Jet..	29.5	Beltville	126.9
Marshalltown.	32.0	Hyattsville	133.4
Newark	40.0	Bladenburg	133.9
Elkton, Md....	46.6	Washington	139.4

Washington-Cumberland.

Miles	Miles
Washington ... 0.0	Benevola 62.7
Bethesda 7.4	Hagerstown ... 70.7
Rockville 15.3	Hancock 97.7
Gaithersburg ... 20.5	Bellegrove 110.7
Clarksburg 28.5	Piney Grove 114.7
Hyattstown 32.4	Pratt 122.7
Frederick 43.7	Gilpen 125.7
Middletown ... 51.7	Filntstone 126.7
Boonsboro 59.7	Cumberland 139.7

Cumberland-Wheeling.

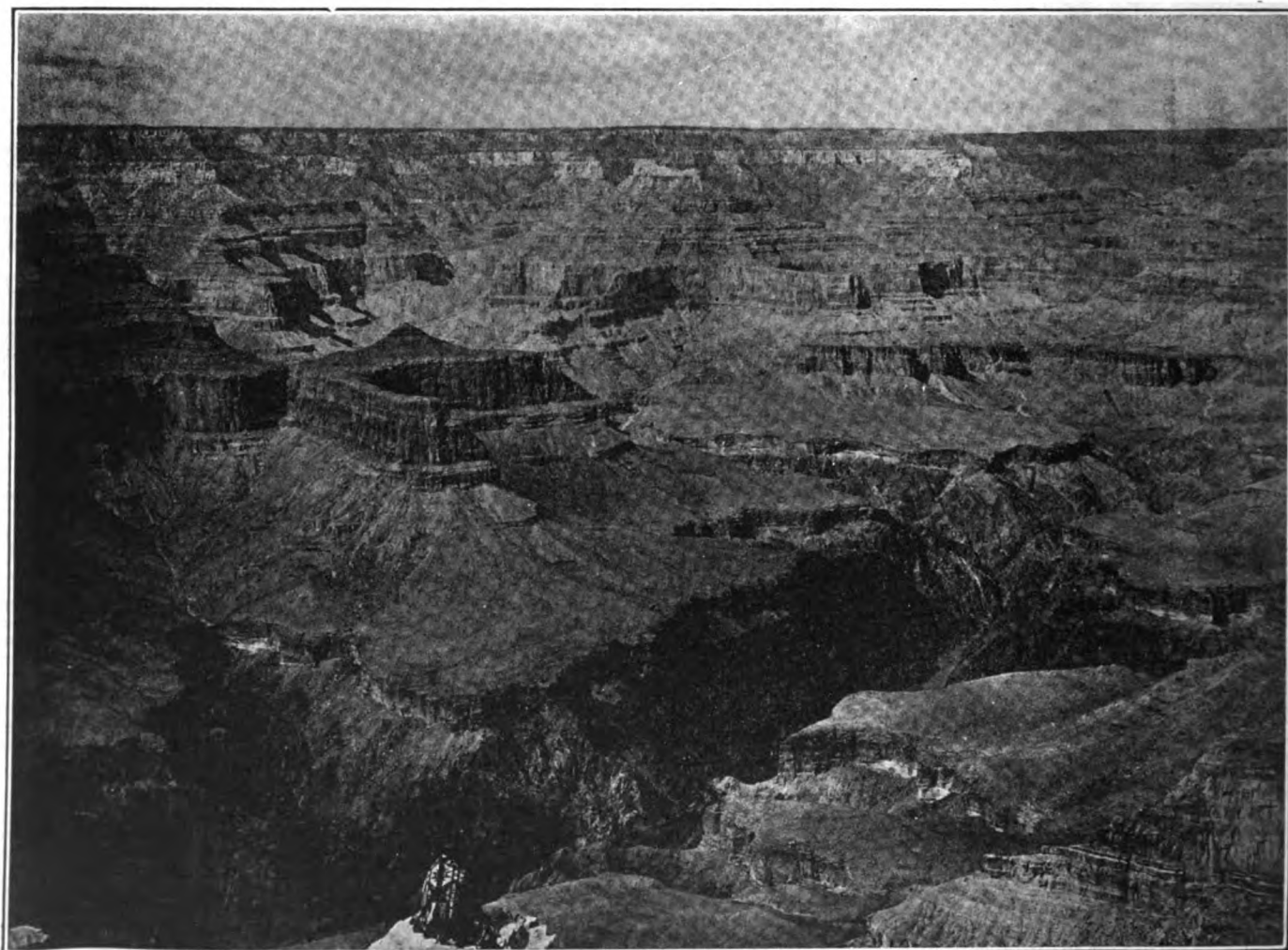
	Miles		Miles
Cumberland . . .	0.0	Summit	54.0
Frostburg	11.0	Uniontown	62.0
Grantville	25.0	Brownsville . . .	74.0
Keyser Ridge . .	31.0	Scenery Hill . . .	84.0
Addison	36.0	Washington	90.0
Somerfield	40.0	Clayville	100.0
Farmington	50.0	Wheeling	132.0

Wheeling-Columbus.

Miles		Miles	
Wheeling	0.0	Norwich	60.5
Bridgeport	1.2	Zanesville	72.4
St. Clairsville.	10.9	Sterling	80.5
Lloydsville	16.1	Brownsville	84.3
Morristown	19.9	Linnville	91.9
Hendricksburg	25.6	Jacktown	95.9
Fairview	29.0	Hebron	99.0
Washington	40.6	Kirksville	105.0
Cambridge	49.0	Etna	111.6
New Concord.	57.3	Columbus	128.1

Columbus-Indianapolis.

Miles		Miles	
Columbus	0.0	Dayton	67.5
Alton	9.4	New Lebanon ..	78.3
W. Jefferson...	14.4	Johnsville	80.3
Lafayette	21.8	W. Alexandria.	80.3
Summerford ...	26.5	Eaton, O.	91.7
Brighton	30.3	Richmond, Ind.	107.6
Vienna	32.9	Centerville ...	113.7



A Scene of Indescribable Grandeur in the Grand Canyon of Arizona—Main Chasm Is 217 Miles Long and 9000 Feet Deep.



Highway Passing Through the Hills.

Harmony	37.5	Cambridge City	123.0
Springfield	43.4	Lewisville	132.8
Emon	51.2	Knightstown	142.2
Fairfield	57.4	Greenfield	155.3
Harshman	63.7	Indianapolis	176.4

Indianapolis-Terre Haute.

Indianapolis	0.0	Coatsville	40.0
Bridgeport	9.0	Reelsville	45.9
Plainfield	13.8	Harmony	51.8
Belleville	18.7	Brasil	54.9
Stilesville	26.9	Seelyville	62.5
Mt. Meridan	33.9	Terre Haute	70.4

Terre Haute-St. Louis.

Terre Haute	0.0	Vandalia	100.2
Marshall, Ill.	16.8	Hagerstown	104.5
Martinsville	27.6	Mulberry	111.3
Casey	33.9	Greenville	120.0
Greenup	43.7	Pocahontas	130.0
Teutopolis	62.1	Highland	139.0
Elmham	66.0	Collinsville	160.0
Altamont	80.4	St. Louis, Mo.	172.0

St. Louis-Columbia.

St. Louis	0.0	Warrenton	65.9
Wellston	6.4	Jonesburg	75.7
Pattonville	14.4	Danville	88.7
St. Charles	19.8	Mincola	91.4
Colterville	30.8	Calwood	109.1
Wentzville	45.1	Fulton	117.0
Fortistell	52.1	Millersburg	123.1
Wright	56.6	Columbia	140.7

Columbia-Kansas City.

Columbia	0.0	Dover	103.5
Recheport	14.4	Lexington	114.5
New Franklin	30.1	Wellington	121.5
Booneville	33.1	Levasy	132.3
Arrow Rock	53.6	Independence	150.2
Marshall	70.5	Centropolla	154.4
Waverly	92.3	Kansas City	159.2

Kansas City-Emporia.

Kansas City	0.0	Ottawa	71.2
Martin City	16.4	Williamsburg	88.4
Olathe	28.8	Waverly	101.5
Edgerton	46.7	Emporia	134.1

Emporia-Hutchinson.

Emporia	0.0	Florence	48.8
Cottonwood	21.8	Peabody	63.7
Elmdale	28.0	Halstead	95.2
Clements	35.7	Hutchinson	122.3

Hutchinson-Dodge City.

Hutchinson	0.0	Great Bend	68.0
Sterling	24.9	Kingsley	116.7
Lyons	34.4	Spearsville	137.7
Chase	44.1	Dodge City	154.8
Ellinwood	57.6		

Dodge City-Syracuse.

Dodge City	0.0	Lakin	78.1
Colmarren	19.2	Kendall	95.0
Ingalls	26.2	Syracuse	107.4
Garden City	53.0		

Syracuse-La Junta.

Syracuse	0.0	Prowers	65.4
Holly	22.0	Las Animas	93.7
Granada	39.7	La Junta	115.5
Lamar	57.3		

La Junta-Trinidad.

La Junta	0.0	Kadrew	76.2
Timpas	23.3	El Mora	87.6
Thatcher	54.8	Trinidad	91.3

Trinidad-Las Vegas.

Trinidad	0.0	Springer	69.7
Raton, N. M.	25.4	Wagon Mound	97.6
Maxwell	54.1	Watrous	120.5
French	58.9	Las Vegas	141.0

Las Vegas-Santa Fe.

Las Vegas	0.0	Pecos	49.5
Tecolote	12.0	Glorieta	55.6
Bernal	18.2	Canoncito	60.0
Pajarita	40.5	Santa Fe	75.2
Rowe	42.8		

Santa Fe-Albuquerque.

Santa Fe	0.0	Sandia	52.5
Domingo	26.9	Alameda	53.7
Algodones	41.2	Albuquerque	66.7

Albuquerque-McCarty's.

Albuquerque	0.0	Casa Blanca	58.1
Atrisco	3.3	McCarty's	82.2
Laguna	48.3		

McCarty's-Gallup.

McCarty's	0.0	Thoreau	43.0
Grant's	13.0	Gonzales	50.0
Totoc	17.0	Guam	54.0
Bluewater	25.0	Perea	58.0
Baca	33.0	Wingate	64.0
Chaves	40.0	Gallup	76.0

Gallup-Holbrook.

Gallup	0.0	Pinto	88.0
St. Michael's	26.0	Petrified Forest	102.0
Wide Ruins	56.0	Carrizito	111.0
Navajo	81.0	Holbrook	124.0

Holbrook-Flagstaff.

Holbrook	0.0	Tolchaco	75.4
Winslow	38.0	Flagstaff	117.0
Leupp	64.6		

Flagstaff-Kingman.

Flagstaff	0.0	Pica	101.0
Riordan	7.0	Yampai	106.0
Bellemont	12.0	Field's Station	108.0
Maine	20.0	Peach Springs	120.0
Chalender	24.0	Cherokee	126.0
Williams	38.0	Truxton	132.0
McClellan	44.0	Valentine	139.0
Ash Fork	58.0	Hackberry	144.0
Pineveta S'tion	64.0	Antares	151.0
Crookton	69.0	Hualpai	158.0
Seligman	81.0	Louise	172.0
Chino	86.0	Kingman	174.0

Kingman-Amboy.

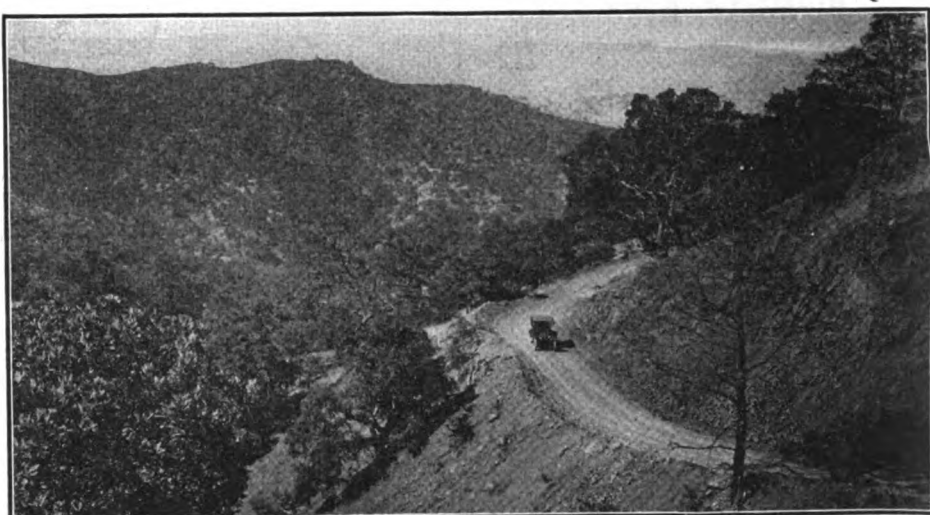
Kingman	0.0	Homer	94.0
McConico	4.0	Goff's	102.0
Yucca	25.0	Fenner	111.0
Topcock	55.0	Danby	127.0
Needles	71.0	Cadis	140.0
Klinefelter	83.0	Amboy	154.0

Amboy-San Bernadino.

Amboy	0.0	Todd	88.0
Bagdad	7.0	Hicks	94.0
Ash Hill	21.0	Hellen	103.0
Ludlow	28.0	Oro Grade	113.0
Lavie	37.0	Victorville	119.0
Plagah	42.0	Hesperia	127.0
Hector	47.0	Cajon	140.0
Newberry	61.0	Cosy Dell Store	142.0
Mincola	67.0	Devore Store	149.0
Daggett	73.0	Vermont	151.0
Barstow	83.0	San Bernadino	160.0

San Bernadino-Los Angeles.

San Bernadino	0.0	Pomona	46.8
Riverside	10.9	Lemon	54.8
Bloomington	18.7	San Marino	72.7
Etiwanda	30.9	Le Senda	74.7
N. Cuckamonga	34.9	Pasadena	79.1
Upland	38.5	Los Angeles	89.9



A Road in California.

Dixie Highway

ITINERARY.

Night Stops — Chicago, Indianapolis, Louisville, Ky.; Nashville, Chattanooga, Atlanta, Macon, Jacksonville, Miami, Gainesville, Tallahassee, Macon, Knoxville, Cincinnati, Toledo, Detroit, Tawas City, Mackinaw, Muskegon, South Bend.

Chicago-Danville, Ill.

Miles	Miles
Chicago..... 0.0	Watseka..... 84.2
Chicago H'ghts 28.8	Hoopston..... 107.2
Momence..... 54.0	Danville..... 135.8

Danville, Ill.-Indianapolis, Ind.

Miles	Miles
Danville..... 0.0	Brownsville..... 74.6
Covington, Ind. 12.8	Indianapolis..... 88.9

Indianapolis-Dayton, O.

Miles	Miles
Indianapolis..... 0.0	Eaton, O..... 84.6
Knightstown... 34.2	Dayton..... 108.6
Richmond, Ind. 68.8	

Indianapolis-Louisville, Ky.

Miles	Miles
Indianapolis..... 0.0	Bedford..... 77.4
Martinsville... 30.7	Pnoll..... 101.0
Bloomington... 52.8	Louisville..... 147.6

Louisville-Nashville, Tenn.

Miles	Miles
Louisville..... 0.0	Cave City..... 134.1
Elizabethtown 45.3	Russellville..... 194.0
Murfreesboro... 76.6	Nashville..... 249.3

Nashville-Chattanooga.

Miles	Miles
Nashville..... 0.0	Pelham..... 80.4
Laverne..... 15.7	Tracy City..... 93.9
Murfreesboro... 31.8	Sequatchie..... 110.3
Beach Grove... 49.0	Jasper..... 114.2
Manchester..... 63.1	St. Elmo..... 137.3
Hillsboro..... 71.4	Chattanooga..... 140.1

Chattanooga-Atlanta, Ga.

Miles	Miles
Chattanooga..... 0.0	Marietta..... 120.7
Summerville... 45.1	Atlanta..... 139.0
Rome..... 70.5	

Atlanta-Milledgeville.

Miles	Miles
Atlanta..... 0.0	Madison..... 70.8
Decatur..... 6.6	Entonton..... 94.7
Stone Mountain 16.6	Milledgeville..... 116.3

Atlanta-Macon, Ga.

Miles	Miles
Atlanta..... 0.0	Forsyth..... 69.3
Griffin..... 39.8	Macon..... 94.5

Macon-Jacksonville, Fla.

Miles	Miles
Macon..... 0.0	Waycross..... 174.3
Perry..... 28.2	Jacksonville..... 254.8
Fitzgerald..... 95.7	

Jacksonville-Miami, Fla.

Miles	Miles
Jacksonville... 0.0	Melbourne..... 203.3
St. Augustine.. 30.8	Fort Pierce..... 252.1
Hastings..... 58.3	W. P'm Beach... 311.9
Dayton..... 113.2	F. Lauderdale... 354.0
Titusville..... 161.9	Miami..... 381.9

Miami-Jupiter, Fla.

Miles	Miles
Miami..... 0.0	W. P'm Beach... 69.1
F. Lauderdale. 26.1	Jupiter..... 85.9

Jupiter-Arcadia, Fla.

Miles	Miles
Jupiter..... 0.0	Arcadia..... 144.5
Okeechobee.... 54.5	

Arcadia-Gainesville, Fla.

Miles	Miles
Arcadia..... 0.0	Leesburg..... 167.6
Bartow..... 52.5	Ocala..... 205.9
Orlando..... 116.0	Gainesville..... 249.8

Gainesville-Tallahassee.

Miles	Miles
Gainesville..... 0.0	Perry..... 118.4
Newberry..... 26.0	Simmons..... 139.4

Trenton..... 40.3	Lamont..... 150.9
Mayo..... 83.0	Tallahassee..... 151.4

Tallahassee-Jacksonville.

Miles	Miles
Tallahassee.... 0.0	Live Oak..... 83.4
Monticello.... 21.1	Lake City..... 108.6
Madison..... 54.2	Jacksonville... 169.8

Tallahassee-Macon, Ga.

Miles	Miles
Tallahassee.... 0.0	Americus..... 129.1
Thomasville... 34.3	Ft. Valley..... 174.7
Camilla..... 66.5	Macon..... 201.5
Albany..... 92.2	

Macon-Atlanta, Ga.

Miles	Miles
Macon..... 0.0	Griffin..... 54.7
Forsyth..... 25.2	Atlanta..... 94.5

Atlanta-Chattanooga, Tenn.

Miles	Miles
Atlanta..... 0.0	Dalton..... 90.2
Cartersville... 41.3	Chattanooga... 124.6

Chattanooga-Knoxville, Tenn.

Miles	Miles
Chattanooga.... 0.0	Kingston..... 84.0
Dayton..... 38.9	Knoxville..... 131.5

Knoxville-Cincinnati, O.

Miles	Miles
Knoxville..... 0.0	Berea..... 168.6
Cumberland Gap 67.6	Richmond..... 183.3
Middlesboro... 71.4	Lexington..... 209.1
Barbourville... 99.1	Georgetown..... 218.0
Corbin..... 116.1	Williamstown... 252.5
Lindon..... 132.6	Covington..... 289.6
Mt. Vernon..... 148.6	Cincinnati..... 290.5

Cincinnati-Toledo, O.

Miles	Miles
Cincinnati..... 0.0	Sidney..... 96.6
Middletown... 33.0	Lima..... 132.0
Dayton..... 56.1	Findley..... 164.3
Troy..... 76.2	Bowling Green 187.2
Piqua..... 84.2	Toledo..... 210.0

Toledo-Detroit, Mich.

Miles	Miles
Toledo..... 0.0	Old Port..... 29.9
La Salle..... 16.2	Wyandotte..... 46.7
Monroe..... 20.7	Detroit..... 58.4

Detroit-Mackinaw, Mich.

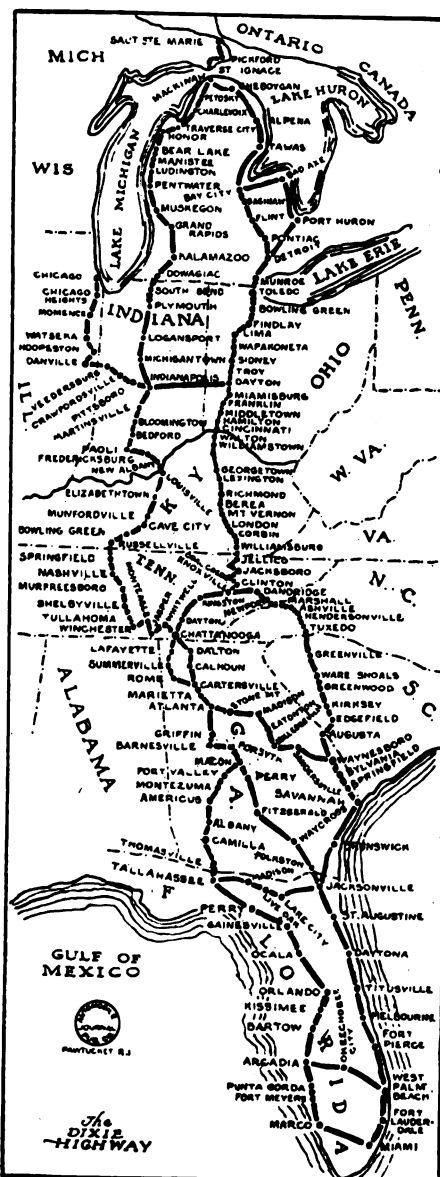
Miles	Miles
Detroit..... 0.0	Alpena..... 271.2
Flint..... 68.9	Onaway..... 340.0
Bay City..... 119.3	Mackinaw..... 382.7
Tawas City..... 196.8	

Mackinaw-South Bend, Ind.

Miles	Miles
Mackinaw..... 0.0	Grand Haven... 251.8
Petosky..... 38.3	Grand Rapids... 283.0
Traverse City 108.9	Kalamazoo..... 331.6
Manistee..... 141.4	South Bend.... 400.7
Muskegon..... 238.8	

South Bend-Indianapolis, Ind.

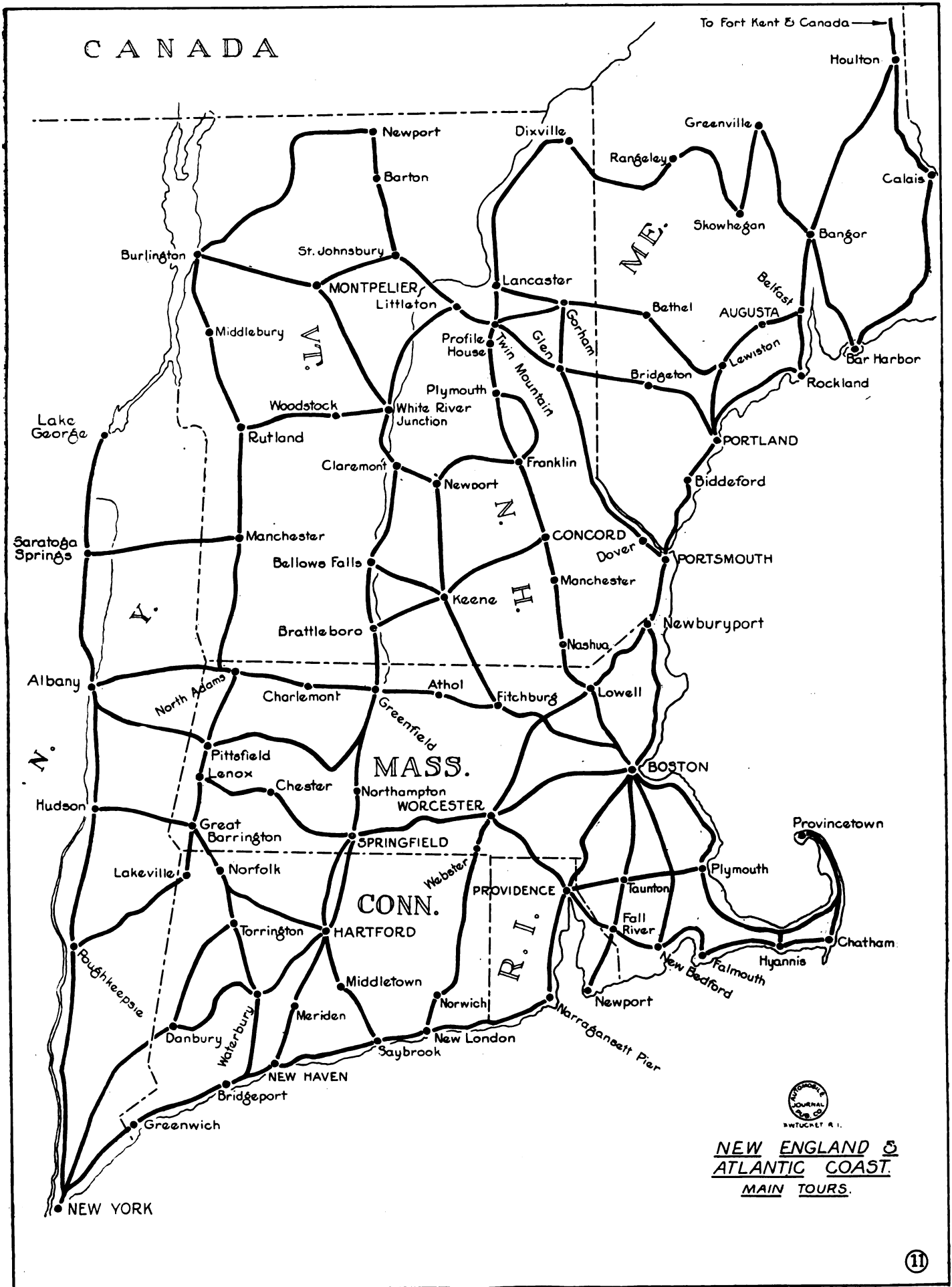
Miles	Miles
South Bend.... 0.0	Logansport..... 65.7
Plymouth..... 23.4	Indianapolis... 135.9



A Perfect Highway in Tennessee.



In the Heart of Cumberland.



Touring New England

TOURING in New England this season has an unusual interest from a historical standpoint from the fact of the approaching celebration in commemoration of the 300th anniversary of the landing of the Pilgrims at Plymouth in 1620. Many towns along Cape Cod, as well as Provincetown, at the tip of the cape, where it is claimed the Forefathers made a landing before their final settlement at Plymouth, have planned elaborate ceremonies in celebration of the anniversary, while the big event at Plymouth itself is scheduled to start in December of this year, will continue through the summer months of 1921 and will probably form one of the chief features of the vacation season in Massachusetts next year.

The State of Maine also celebrates the centennial of its birth as a separate state this year, it having been set off from Massachusetts in 1820. The event is formally observed with elaborate exercises continuing a week at Portland in which other towns in the state participate.

New England's diversity of seashore, mountains, green fields and shady woodland offers unlimited attractions for motoring tours of almost any length to suit the taste of the individual tourist. To exemplify this it is only necessary to enumerate a few of her natural resources in the way of scenic grandeur and picturesqueness. For mountains she presents the White hills of New Hampshire, the verdure-clad Green range of Vermont and the rugged slopes of the Berkshires of Massachusetts; for lakes the Rangeleys, Moosehead, Sunapee, Winnepesaukee, Belgrade and Champlain; for river valleys, the Connecticut, Naugatuck, Merimack, Androscoggin and Kennebec; and, finally, as a grand and glorious climax, more than 1000 miles of the finest and most fascinating sea coast to be found in the country.

As to roads, New England is fast coming to the fore in the matter of highway work and there is hardly a town or village which is not



Pilgrim Monument Overlooking Plymouth, Mass., Commemorative of the Landing of the Pilgrim Fathers in 1620.

now contributing something to swell the mileage of permanent good roads, to say nothing of the work in connection with the federal, state and county aid movements. It is possible now to reach a majority of the more interesting attrac-

tions of New England without getting far off good roads; surely sufficiently varied itineraries may be planned to appeal to the taste of the most exacting tourist.

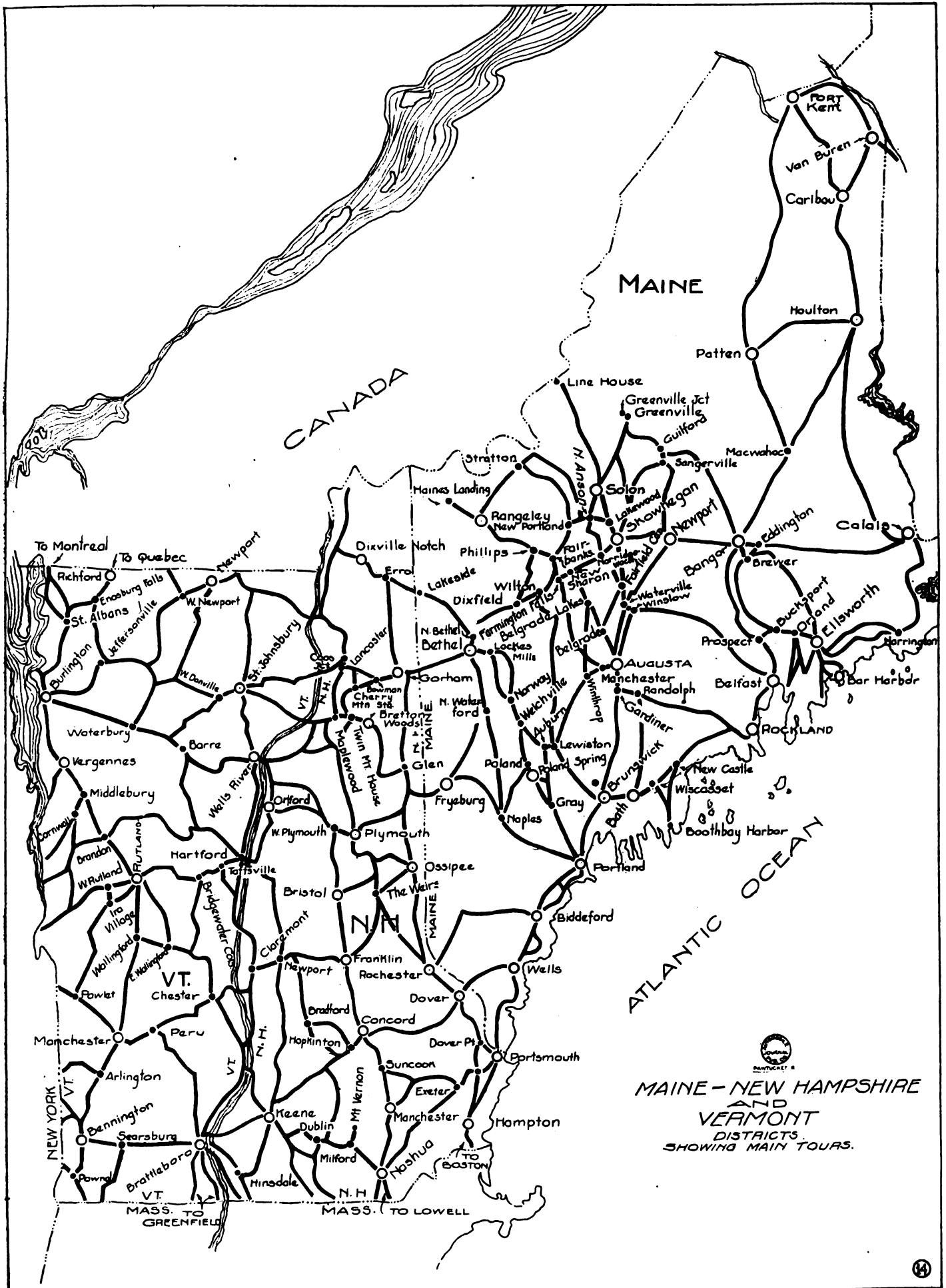
There are several well recognized trunk routes in New England which, if followed wholly or in part, are certain to afford a full measure of satisfaction, not only as regards the primary requisites of roads and hotels, but also with respect to scenic and historic points of attraction. One of these is the Shore road to Boston with its extension through Portsmouth and Portland and along the general line of the Maine coast to Bangor and Bar Harbor. This is a very popular tour with motorists because of its almost universally excellent road surface, as well as the multitude of first class hotels which are to be found at frequent intervals. One or more sections of it should be included in every tour which is taken in New England, such, for instance as the stretch between Boston and Portland. Here, in relatively few miles are crowded some of the most charming bits of shore scenery to be found anywhere along the Atlantic coast.

Another section of the trip along the Massachusetts coast which should not be omitted from any New England itinerary, is the circuit of Cape Cod. The best way to reach Cape Cod from New York is to follow the shore road through New Haven and New London as far as Narragansett Pier and Saunterstown. Here one may ferry across Narragansett bay to Jamestown island and Newport. After Newport comes Fall River and New Bedford, two of Massachusetts' most prosperous manufacturing cities, and then, a few miles further on, Cape Cod itself.

The route which is usually followed is that along the south shore through Falmouth and Chatham to Orleans and then back along the north shore to Plymouth, with its associations of provincial days. Here in addition to the famous Plymouth Rock is Pilgrim hall with its interesting historical collection.



Beneath This Canopy at Plymouth, Mass., is Preserved the Rock on Which the Feet of the Pilgrim Fathers First Touched When Disembarking from the Mayflower. (The Plans of the Tercentenary Commission, Contemplate Replacing the Rock in Its Original Bed at Sea Level and Rearranging the Entire Water Front in Accordance with Its Original Lines by the Building of a Granite Sea Wall and Making the Whole a Beautiful National Park.)



New England Routes

NEW YORK TO BOSTON VIA NEW HAVEN.

New York-New Haven.

Miles	Miles
New York..... 0.0	Norwalk..... 43.7
New Rochelle... 18.0	Westport..... 47.0
Larchmont..... 19.8	Southport..... 51.3
Mamaroneck... 21.4	Fairfield..... 52.8
Rye..... 25.2	Bridgeport..... 57.5
Portchester... 26.9	Stratford..... 61.1
Greenwich..... 29.8	Milford..... 65.7
Stamford..... 35.0	New Haven..... 75.0
Darien..... 39.2	

North Attleboro 12.3	Dedham..... 34.2
Plainville..... 14.0	Forest Hills... 38.7
Wampum..... 17.4	Boston..... 44.2
Wrentham..... 18.9	

NEW HAVEN TO BOSTON VIA SPRINGFIELD.

New Haven-Hartford.

Miles	Miles
New Haven..... 0.0	Meriden..... 19.9
North Haven... 8.1	Berlin..... 26.1
Wallingford... 13.5	Hartford..... 37.1

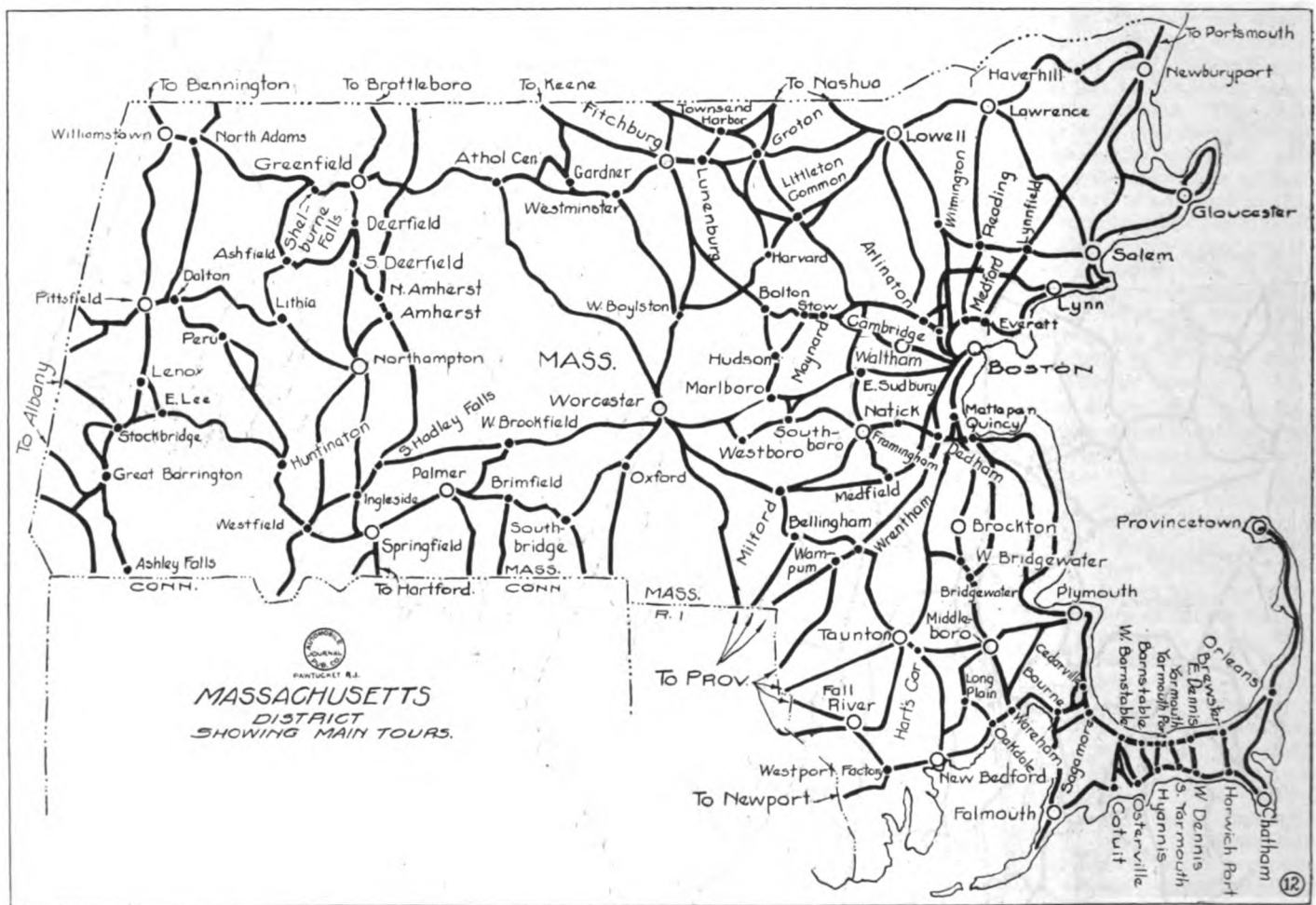
NEW YORK TO DANBURY AND POINTS IN CONNECTICUT.

New York-Danbury.

Miles	Miles
New York..... 0.0	Cross River... 44.3
White Plains... 23.4	South Salem... 48.5
Armonk..... 31.3	Ridgefield..... 52.5
Bedford..... 39.3	Danbury..... 62.0

Danbury-New Haven.

Miles	Miles
Danbury..... 0.0	Huntington... 21.0
Bethel..... 3.4	Shelton..... 24.6
Dodgingtown... 6.5	Derby..... 24.9



New Haven-New London.

Miles	Miles
East Haven..... 4.5	Westbrook..... 29.2
Brandford..... 7.5	Saybrook..... 33.4
Gilford..... 16.1	Lyme..... 36.7
Madison..... 21.0	Flanders..... 46.0
Clinton..... 24.9	New London... 52.8

New London-Providence.

Miles	Miles
New London..... 0.0	Wakefield..... 36.6
Groton..... 1.1	Narragansett... 41.2
Mystic..... 7.7	Wickford..... 52.9
Stonington... 10.7	East Greenwich 60.2
Westerly..... 17.0	Apponaug..... 62.7
Charlestown... 28.8	Providence... 72.7

Providence-Boston.

Miles	Miles
Providence..... 0.0	Walpole..... 25.7
Pawtucket..... 4.3	Norwood..... 30.0

Hartford-Springfield.

Miles	Miles
Hartford..... 0.0	Thompsonville... 18.6
East Hartford... 1.9	Long Meadow... 22.2
Warehouse Pt... 13.4	Springfield... 24.7
Enfield..... 17.5	

Springfield-Worcester.

Miles	Miles
Springfield..... 0.0	Brookfield..... 32.9
N. Wilbraham... 9.6	E. Brookfield... 36.3
Palmer..... 15.7	Spencer..... 39.4
West Warren... 24.0	Leicester..... 44.3
Warren..... 28.5	Worcester..... 50.5
W. Brookfield... 30.2	

Worcester-Boston.

Miles	Miles
Worcester..... 0.0	South Sudbury... 23.0
Shrewsbury..... 5.5	Wayland..... 26.2
Northboro..... 10.0	Weston..... 29.7
Marlboro..... 15.8	Boston..... 43.5

Stepney..... 14.7	New Haven..... 34.5
-------------------	---------------------

Danbury-Bridgeport.

Miles	Miles
Danbury..... 0.0	Red Ridge..... 10.4
Bethel..... 3.4	Easton..... 16.3
Redding..... 8.5	Bridgeport... 25.5

Danbury-Waterbury.

Miles	Miles
Danbury..... 0.0	Southbury..... 17.6
Newtown..... 9.2	Middlebury... 25.9
Sandy Hook... 10.7	Waterbury... 31.6

Danbury-Norwalk.

Miles	Miles
Danbury..... 0.0	Norwalk..... 22.1
Branchville... 10.5	

Danbury-Stamford.

Miles	Miles
Danbury..... 0.0	Glenbrook..... 26.6
Lewisboro..... 13.8	Stamford..... 28.5
New Canaan... 20.7	

Waterbury-Hartford.

Miles	Miles
Waterbury..... 0.0	Plainville 16.7
Marion..... 6.7	Farmington 21.3
Milldale..... 8.1	Hartford 30.4
Southington..... 11.9	

NEW YORK TO WHITE MOUNTAINS
VIA GREENFIELD.

New York-Pittsfield.

Miles	Miles
New York..... 0.0	Wassale 90.0
Yonkers..... 14.0	Amenia 93.5
Dobbs Ferry..... 19.2	Millerton 102.5
Tarrytown..... 24.2	Lakeville 106.4
Briarcliff..... 30.9	Salisbury 107.9
Yorktown H'ths..... 41.6	S. Egremont..... 121.4
Carmel..... 57.4	Great Bar'gton..... 125.0
Patterson..... 65.8	Stockbridge 132.4
Pawling..... 70.5	Lenox 138.3
South Dover..... 78.3	Pittsfield 145.0

Orford..... 22.3	Bethlehem 67.2
Piermont..... 28.3	White Mts.
Haverhill..... 33.5	(Twin Mtn. H. 75.5)

NEW YORK TO WHITE MOUNTAINS
VIA BURLINGTON.

Pittsfield-Rutland.

Miles	Miles
Pittsfield..... 0.0	Manchester 58.5
Lanesboro..... 5.3	Manchester C. 59.8
Williamstown..... 21.5	E. Dorset..... 65.1
Bennington..... 35.5	Danby 72.8
Shaftsbury..... 43.2	Wallingford..... 82.1
Arlington..... 50.4	Rutland 92.5

Pittsfield-Keene.

Miles	Miles
Pittsfield..... 0.0	Stamford 28.5
Cheshire..... 10.7	Heartwell, V. 34.1
Adams..... 15.8	Searsburg 40.2
North Adams..... 22.0	Keene 86.0

OPTIONAL ROUTES.

Rutland-White River Junction.

Miles	Miles
Rutland..... 0.0	Bridgewater 25.2
Mendon..... 4.2	Woodstock 31.7
Sherburne..... 13.4	Taftsville 35.0
W. Bridgewater..... 17.7	Quechee 38.6
Bridgew'r Crm. 23.7	W. R. Junction..... 45.0

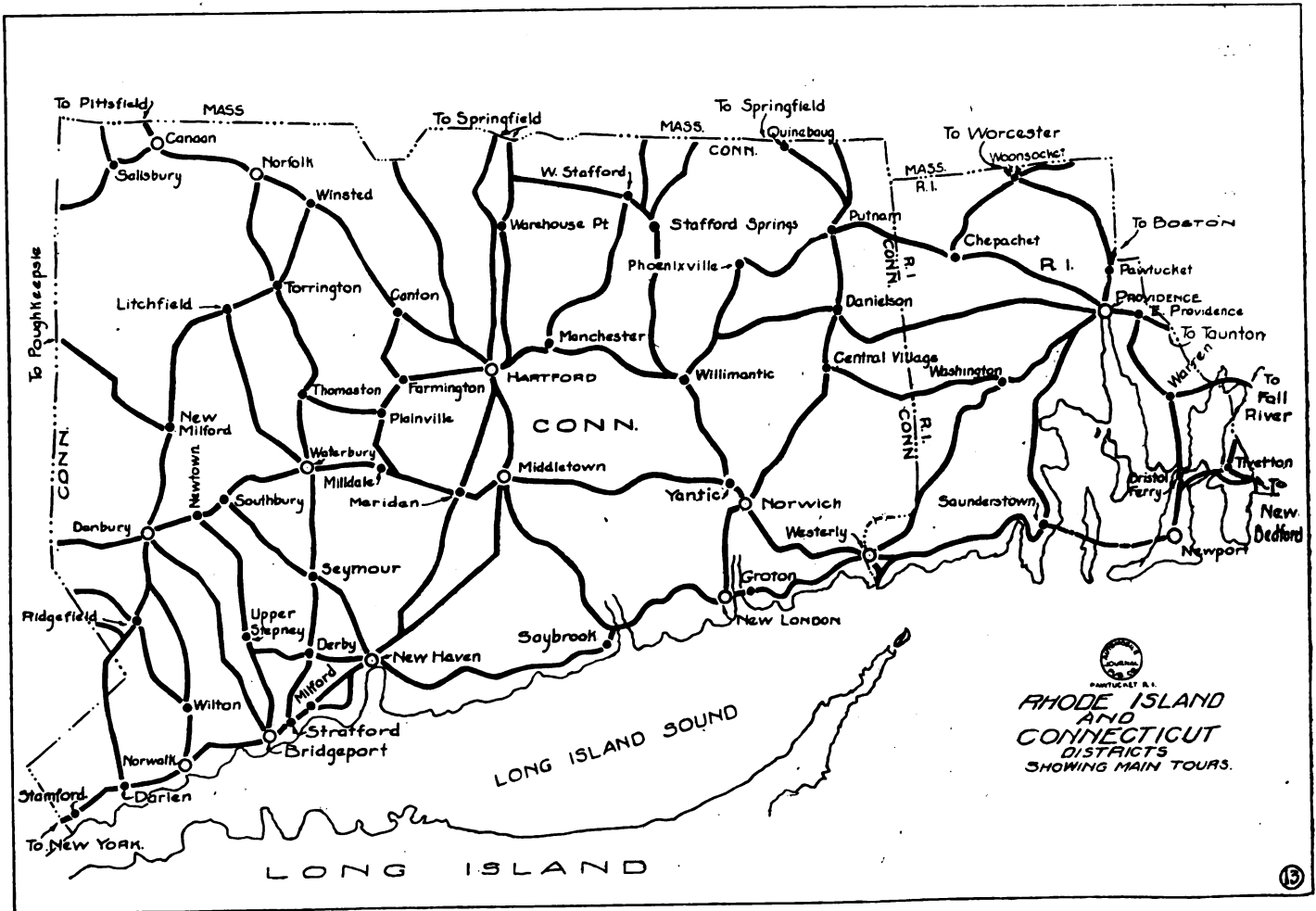
Rutland-Lake George.

Miles	Miles
Rutland..... 0.0	Comstock 33.4
W. Rutland..... 3.7	Fort Ann 37.4
Castleton..... 11.0	Hudson Falls..... 46.4
Castleton Cra. 12.6	Glenns Falls..... 50.0
Fair Haven..... 16.0	Lake George..... 59.0
White Hall..... 26.2	

BOSTON TO WHITE MOUNTAINS.

Boston-Concord.

Miles	Miles
Boston..... 0.0	Nashua 43.5



Pittsfield-Greenfield.

Miles	Miles
Pittsfield..... 0.0	Goshen 30.5
Dalton..... 6.4	Williamsburg..... 36.3
Windsor..... 12.5	Haydenville 38.6
Cummington..... 24.2	Northampton..... 44.5
Lithia..... 28.6	Greenfield..... 64.5

Greenfield-White River Junction.

Miles	Miles
Greenfield..... 0.0	Charlestown 51.5
Bernardston..... 6.0	Claremont 62.5
Gulford..... 17.6	W. Claremont..... 65.2
Brattleboro..... 20.5	Ascutneyville..... 67.4
Putney..... 30.0	Windsor 72.6
Westminster..... 38.6	Hartland 77.4
Bellows Falls..... 44.0	W. River Junc. 87.5

White River Junction-White Mountains.

Miles	Miles
W. River Junc. 0.0	Woodville 44.7
W. Lebanon..... 0.6	Bath 45.9
Hanover..... 4.5	Lisbon 51.6
Lyme..... 15.2	Littleton 62.3

Pittsfield-Burlington.

Miles	Miles
Pittsfield..... 0.0	Hampton 89.2
Manchester..... 58.5	Fair Haven..... 94.0
Man. Cen. P. O. 59.8	Castleton Cor. 97.0
Dorset..... 66.0	Hubbardton..... 104.1
E. Rupert..... 68.0	Sudbury 110.4
Pawlet..... 74.5	Cornwall 122.8
N. Pawlet..... 78.0	Middlebury..... 126.5
Wells..... 80.4	Burlington..... 161.5
Poultney..... 88.2	

Burlington-White Mountains.

Miles	Miles
Burlington..... 0.0	W. Danville..... 65.3
Williston..... 7.8	Danville 68.2
Richmond..... 12.7	St. Johnsbury..... 75.5
Waterbury..... 26.5	Waterford 88.3
Montpelier..... 38.5	Littleton 93.8
E. Montpelier..... 45.5	Bethlehem 98.9
Plainfield..... 48.6	White Mts.
Marshfield..... 55.1	(Twin M. H.) 107.0
E. Cabot..... 62.0	

Winchester..... 11.5	Reeds Ferry..... 53.0
Woburn..... 13.7	Manchester 62.0
Wilmington..... 18.9	Suncook 73.0
Tewksbury..... 24.7	Pembroke 74.6
Lowell..... 29.5	Concord 80.5
Tyngsboro..... 37.1	

Concord-White Mountains.

Miles	Miles
Concord..... 0.0	Holderness 50.2
Penacook..... 6.1	Ashland 54.2
Boscawen..... 8.8	Plymouth 60.0
Franklin..... 18.5	Woodstock..... 77.0
Tilton..... 22.0	N. Woodstock..... 81.0
Winnisquam..... 28.5	Flue House..... 86.0
Laconia..... 31.3	Profile House..... 91.0
Lakeport..... 33.0	White Mts.
Wiers..... 37.5	(Twin M. H.) 104.5
Meredith..... 42.4	

Boston-Portsmouth.

Miles	Miles
Boston..... 0.0	Rawley 38.2
Revere Beach..... 11.1	Newbury 42.5
Lynn..... 15.0	Newburyport .. 46.0

(Continued on Page 31.)

Salem.....	21.5	Sallisbury.....	48.6
Beverly.....	23.1	Smithtown.....	51.3
Wenham.....	28.0	Hampton Falls.....	54.2
Hamilton.....	30.0	Rye Beach.....	62.3
Ipswich.....	34.3	Portsmouth.....	73.5

Portsmouth-White Mountains.

	Miles		Miles
Portsmouth....	0.0	Conway.....	80.5
Dover.....	11.5	N. Conway.....	86.0
Somersworth....	16.3	Intervale.....	87.8
Rochester.....	23.0	Glen.....	91.8
Milton.....	31.0	Bartlett.....	96.0
Union.....	37.0	Bemis.....	104.0
Sanbornville....	42.0	Crawfd House	112.6
Wakefield.....	43.0	Bretton Woods	115.9
Osage.....	53.0	Fabyana.....	116.5
W. Ossipee.....	64.5	White Mts.	
Chocoma.....	68.5	(Twin M. H.)	121.0

PORTSMOUTH TO WHITE MOUNTAINS VIA POLAND SPRINGS.**Portsmouth-Portland.**

PORTSMOUTH-PORTLAND.			
	Miles		Miles
Portsmouth	0.0	Ogunquit	19.0
Kittery	1.1	Wells	24.5
York Cor.	7.6	Kennebunk	29.0
York	8.5	Biddeford	38.5
York Harbor . . .	9.5	Saco	39.5
York Beach	13.2	Dunstan	45.1
Cape Neddick . . .	15.0	Portland	54.0

Portland-Poland Springs and White Mountains.

Mountains.			Miles
	Miles		Miles
Portland.....	0.0	Redstone.....	78.3
Gray.....	17.0	N. Conway.....	81.5
Dry Mills.....	19.6	Intervale.....	83.4
Poland Springs.....	27.5	Glen.....	87.3
Poland.....	30.5	Bartlett.....	83.5
Webbs Mills.....	39.1	Bemis.....	99.5
Cooks Mills.....	43.0	Craw'd House.....	108.1
Naples.....	46.7	Bretton Woods.....	111.4
Bridgton.....	55.1	Fabyans.....	112.0
E. Fryeburg.....	64.9	White Mts.	
Fryeburg.....	70.9	(Twin M. H.)	116.5
Conway.....	75.6		

PORTLAND TO FT. KENT VIA BANGOR.**Portland-Rockland.**

Miles		Miles	
Portland.....	0.0	Newcastle.....	54.1
Yarmouth.....	11.9	Damariscotta.....	54.5
Freeport.....	11.7	Waldoboro.....	64.3
Brunswick.....	26.5	West Warren.....	71.3
Woolwich.....	35.7	Thomaston.....	76.7
Wiscasset.....	45.0	Rockland.....	81.0
N. Edgecomb.....	46.7		

Rockland-Bangor.

Rockland-Bangor.			
	Miles		Miles
Rockland.....	0.0	Stockton	37.2
Rockport.....	6.4	Prospect	41.7
Camden.....	8.0	Frankfort	45.7
Northport.....	19.0	Hampden	55.8
Belfast.....	27.0	Bangor	62.0
Searsport.....	33.0		

Bangor-Houlton.

Miles		Miles	
Bangor.....	0.0	Lincoln.....	49.0
Orono.....	8.0	Matawamkeag..	63.0
Oldtown.....	13.0	Macwahoe.....	72.5
Passadumkeag..	32.0	Haynesville...	92.5
West Enfield..	37.0	Houlton.....	117.0

Houlton-Fort Kent.

Miles		Miles	
Houlton	0.0	North Lenton..	60.5
Middleton.....	7.3	Van Buren.....	76.2
Monticello.....	12.8	Grand Isle.....	91.7
Blaine.....	26.5	Madawaska ...	100.5
Presque Isle....	41.5	Fort Kent.....	120.5
Carribou	54.2		

OPTIONAL TRIPS.**Bangor-Skowhegan.**

	Miles		Miles
Bangor.....	0.0	Newport	26.3
Hermion.....	7.5	Palmyra.....	30.6
Carmel.....	14.7	Canaan.....	42.5
Etna.....	18.0	Skowhegan....	51.0

Skowhegan-Rangeley.

Skowhegan-Rangely.			
Miles		Miles	
Skowhegan....	0.0	Dead River.....	43.0
Lakewood.....	5.7	Flagstaff	52.1
North Anson... 12.5		Stratton	63.1

N. New Port'd.....	21.1	Rangeley.....	83.0
Lexington.....	29.5		

Bar Harbor-Portland.

	Miles		Miles
Bar Harbor....	0.0	Orland	37.0
Ellsworth....	19.8	Bucksport	39.7
East Orland....	33.3	Prospect	40.6
		(Via Bangor Route)	
Portland.....	166.0		

Portland-Augusta.

Miles		Miles	
Portland.....	0.0	Lewiston	33.6
Gray.....	17.0	Greene.....	42.0
Up. Gloucester.....	24.5	Winthrop	54.5
Danville June.....	27.7	Manchester.....	60.6
Auburn.....	33.4	Augusta.....	65.0

PORTLAND TO RANGELEY.**Portland-Rangeley.**

Miles	Miles		
Portland.....	0.0	Howes Corner.....	50.1
Gray.....	17.0	Norlands.....	55.1
Up. Gloucester.....	24.5	Livermore Falls.....	60.2
Danville June.....	27.7	North Jay.....	66.6
Auburn.....	33.4	Wilton.....	69.7
E. Auburn.....	36.5	Farmington.....	77.2
(Via Augusta Route)			
Rangeley.....	119.0		

Provincetown-Providence.

Miles		Miles	
Provincetown . . .	0.0	Onset	69.6
Truro	9.7	Wareham	74.0
Wellfleet	14.5	Marion	79.2
Eastham	23.4	Mattapoisett . .	84.0
Orleans	27.0	Fairhaven	90.0
Brewster	32.6	New Bedford . .	91.0
Dennis	39.2	Westport Ferry .	97.5
Yarmouth	42.5	Fall River	102.5
Barnstable	46.5	Swansea	109.1
Sandwich	58.8	Seekonk	119.4
W. Sagamore . . .	61.0	Providence	124.0

Boston-Plymouth.

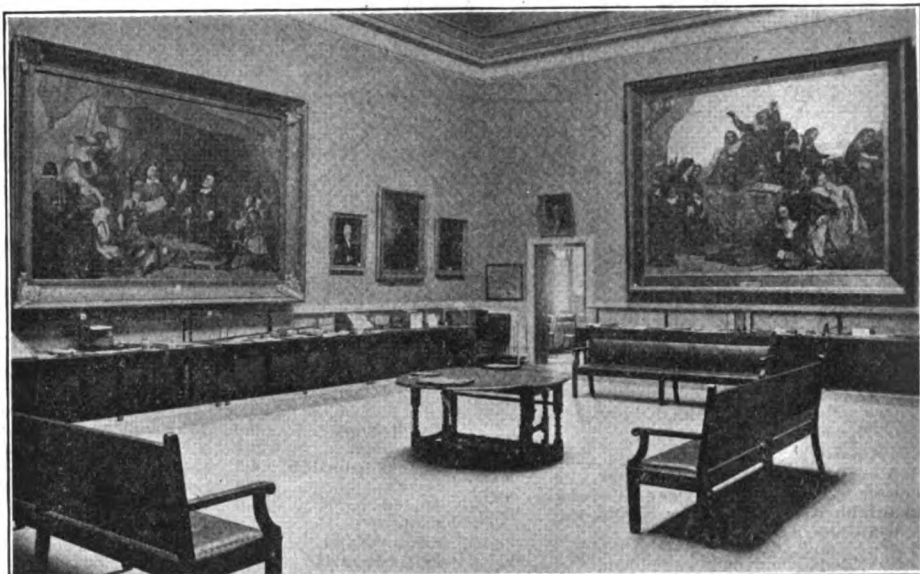
	Miles		Miles
Boston.....	0.0	Greenbush.....	29.6
Forest Hills....	5.7	Marshfield Cen....	35.3
Quincy.....	13.0	Marshfield.....	37.7
Hingham.....	17.3	Kington.....	45.9
Cohasset.....	23.9	Plymouth.....	50.5

Boston-Newport, R. I.

Boston-Newport, R. I.			
	Miles		Miles
Boston.....	0.0	Dighton.....	41.8
Forest Hills....	5.7	Somerset.....	45.1
Punkapog.....	14.0	Fall River.....	50.8
Stoughton.....	19.1	Tiverton.....	57.3
Taunton.....	26.4	Newport.....	69.5

Providence-Newport, R. I.

	Miles		Miles
Providence.....	0.0	Bristol Ferry...	16.7



Interior View of One Section of Pilgrim Hall at Plymouth, Mass., Which is a Memorial of the Landing of the Pilgrims in 1620.

MOOSEHEAD ROUTE VIA AUGUSTA.

Warren.....	12.2	Newport.....	28.5
-------------	------	--------------	------

Augusta-Moosehead.

Miles		Miles	
Augusta.....	0.0	Athens	49.0
Vassalboro.....	11.7	Brighton	57.5
Waterville.....	19.5	Kingsbury	63.4
Fairfield Centre	23.0	Greenville.....	90.8
Skowhegan....	36.0	Greenville June.	92.5
(Boats to Moosehead.)			

CAPE TRIPS FROM BOSTON.**Boston-Falmouth.**

	Miles		Miles
Boston	0.0	Tremont	48.8
Randolph	15.8	Wareham	52.0
Avon	18.2	Onset	56.3
Broekton	22.0	Bourne	60.5
W. Bridgewater	26.5	Monument B'ch	62.4
Bridgewater	29.3	West Falmouth	71.5
Middleboro	37.5	Falmouth	75.5

Falmouth-Chatham.

	Miles		Miles
Falmouth.....	0.0	Centerville	21.2
Wauquoit.....	6.6	Hyannis	25.1
Mashpee.....	11.7	S. Yarmouth....	30.6
Santuit.....	13.6	S. Harwich.....	35.3
Marston Mills..	15.7	Chatham	43.5

Chatham-Provincetown.

	Miles		Miles
Chatham.....	0.0	Wellfleet	22.0
Orleans.....	9.5	Truro	26.7
Eastham.....	13.0	Provincetown..	36.5

Boston-Gloucester, Mass.

	Miles		Miles
Boston	0.0	Salem	22.9
Cambridge.....	1.6	Beverly.....	25.5
Somerville.....	2.6	Pride's Crossing.....	28.8
Everett.....	5.4	Beverly Farms.....	29.5
Revere Beach.....	10.3	Manchester.....	32.1
Lynn.....	15.4	Maguolia.....	35.5
Swampscott.....	17.2	Gloucester.....	39.3

Around Cape Ann.

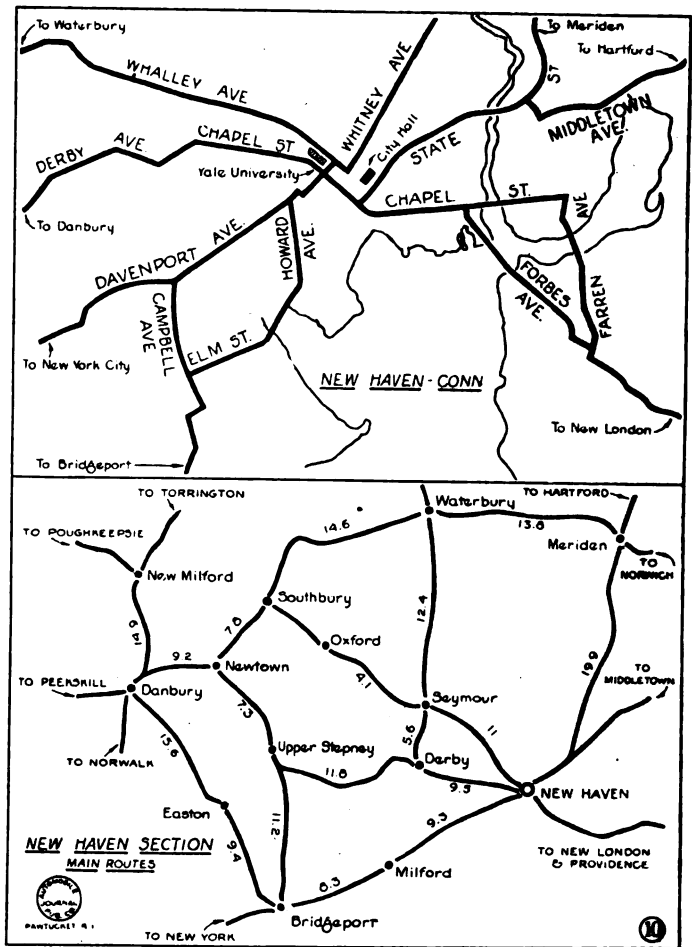
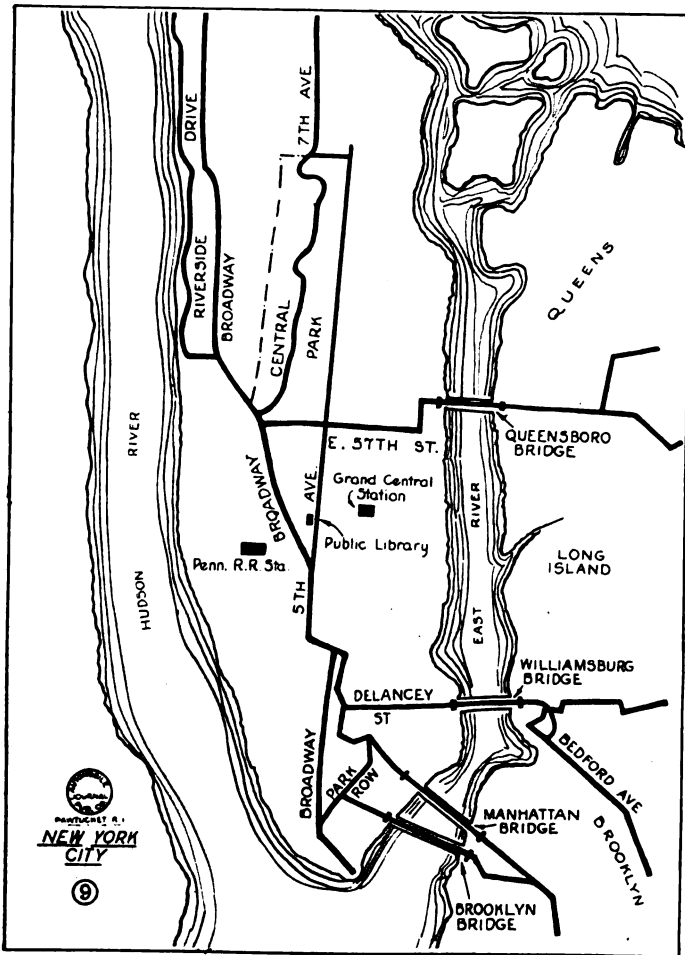
	Miles		Miles
Glou'ter, Mass.	0.0	Annisquam.....	11.1
Rockport.....	4.2	Riverdale	12.3
Pigeon Cove...	5.9	Gloucester	13.8
Ocean View...	7.6		

Boston-Nantasket Beach, Mass.

Miles		Miles	
Boston	0.0	Quincy	14.5
Brookline	3.2	North Weymouth	18.4
Forest Hills	5.8	North Cohasset	23.3
Ashmont	9.7	Nantasket Beach	24.3

Boston-Mt. Wachusett, Mass.

Boston-Mt. Wachusett, Mass.			
	Miles		Miles
Boston	0.0	Stow	24.7
Allston	3.1	Bolton	30.5
Watertown	5.7	Clinton	35.7
Beaver Brook	8.1	Sterling	40.6
Waltham	9.8	West Sterling	44.4
Kendal Green	11.1	Princeton	47.7
Maynard	21.5	Mt. Wachusett	52.7



Providence, R. I.-Buzzard's Bay, Mass.

Miles	Miles
Providence . . . 0.0	Tremont . . . 39.7
Reh'both, Mass. . 8.8	Wareham . . . 44.6
Taunton . . . 18.0	East Wareham . 46.9
Middleboro . . 29.3	Buzzard's Bay . 50.2
S. Middleboro . 35.9	

Burlington-Newport, Vt.

Miles	Miles
Burlington . . . 0.0	Johnson . . . 38.0
Winoaki . . . 2.1	N. Hyde Park . 43.5
Essex Junction . 6.5	Eden . . . 47.6
Essex . . . 9.6	Lowell . . . 57.7
Jerico . . . 12.9	Westfield . . 64.3
Underhill . . . 16.2	Troy . . . 66.3
Cambridge . . . 26.4	Newport . . . 77.0
Jeffersonville . 29.0	

Bangor, Me.-Fredericton, N. B.

Miles	Miles
Bangor . . . 0.0	Sylvan Park . . 92.0
Holden Center . 6.0	Machias . . . 93.4
Holden . . . 8.8	East Machias . 97.7
N. Ellsworth . . 21.0	Whiting . . . 110.1
Ellsworth Falls 25.2	Dennysville . . 119.7
Ellsworth . . . 26.8	West Pembroke 126.1
Wash. Junction 28.9	Pembroke . . . 126.0
Hancock . . . 36.2	Bill Cove . . . 135.9
Waukeag Sta. . 37.1	Robbinston . . 137.3
W. Sullivan . . 37.5	Red Beach . . . 141.1
Sullivan . . . 39.2	Calais . . . 149.8
E. Sullivan . . 41.9	St. Steph'n, N. B. 150.3
Askville . . . 43.8	Moose Mills . . 157.6
Gouldsboro . . 46.6	Mooseydale . . 164.0
Steuben . . . 53.3	Lawrence Sta. . 169.1
Millbridge . . 58.8	Low. Brookway 176.8
Cherryfield . . 64.3	York's Mills . . 187.4
Harrington . . 70.7	Harvey . . . 196.2
Columbia Falls 75.6	Hammondville . 211.3
Jonesboro . . . 84.0	Spring Hill . . 222.2
Whitneyville . 89.6	Fredericton . . 227.4

MOHAWK TRAIL FROM BOSTON.

Boston-Greenfield.

Miles	Miles
Boston . . . 0.0	Westminster . 54.3
Cambridge . . 0.8	Gardner . . . 58.8
Lexington . . 11.4	Otter River . . 63.4
Concord . . . 11.5	Baldwinville . 64.6
North Acton . 25.0	Athol . . . 74.7
Littleton . . . 27.8	Orange . . . 79.3
Littleton Center 28.6	Erving . . . 84.3
Ayer . . . 34.7	Millers Falls . 90.6
Lunenburg . . 43.0	Turners Falls . 94.8
Fitchburg . . 47.0	Greenfield . . 98.0

Greenfield-Albany.

Miles	Miles
Greenfield . . 0.0	N. Bownal . . . 49.8
Shelburne . . . 5.4	N. Petersburg . 53.5
Shelburne Falls 9.0	Petersburg . . 59.0
Charlton . . . 17.5	Brunswick Cor. 74.7
North Adams . 36.5	Troy . . . 79.5
Williamstown . 41.5	Albany . . . 85.0
Bownal . . . 46.9	

ROUTES TO CANADA.

Burlington-Montreal.

Miles	Miles
Burlington . . 0.0	Rouses Point . 48.5
Winoaki . . . 2.1	Lacolle . . . 56.8
Colchester . . 6.2	Naperville . . 64.8
South Hero . . 18.1	Douglas Corner 67.1
Grand Isle . . 24.5	St. Jacques . . 72.8
North Hero . . 31.1	Laprairie . . . 85.1
Alburg Passage 36.7	Montreal . . . 94.0
Alburg . . . 45.1	

Newport-Quebec, P. Q.

Miles	Miles
Newport . . . 0.0	D'Isracc . . . 95.5
West Derby . . 0.9	Colrain . . . 100.9
Derby Line . . . 8.2	Black Lake . . 106.9
Rock Island . . 8.5	Thetford Mines 111.7
Stantead . . . 9.8	Robertson . . 117.3
Massawippi . . 22.2	Broughton . . 123.3
Waterville . . . 32.1	Young Junction 133.2
Lenoxville . . 39.3	St. Joseph . . . 141.1
Sand Hill . . . 45.7	Beauce Junction 146.3
Birchton . . . 49.4	St. Marie . . . 152.8
Cookshire . . . 52.4	Scott . . . 158.0
Angus . . . 54.4	St. Maxime . . 158.6
Marbleton . . . 70.6	St. Henri . . . 172.5
Wedon . . . 79.7	St. Louis . . . 177.6
Wedon Lake . . 83.9	Levis . . . 183.0
Garthby . . . 90.3	Quebec . . . 183.5

Burlington-Richford.

Miles	Miles
Burlington . . 0.0	Enosburg Falls 51.0
Milton . . . 19.6	Sampsonville . 55.0
Georgia . . . 26.2	East Berkshire 56.2
St. Albans . . 32.1	Richford . . . 60.8
Sheldon Springs 41.8	

Richford, Vt.-Quebec.

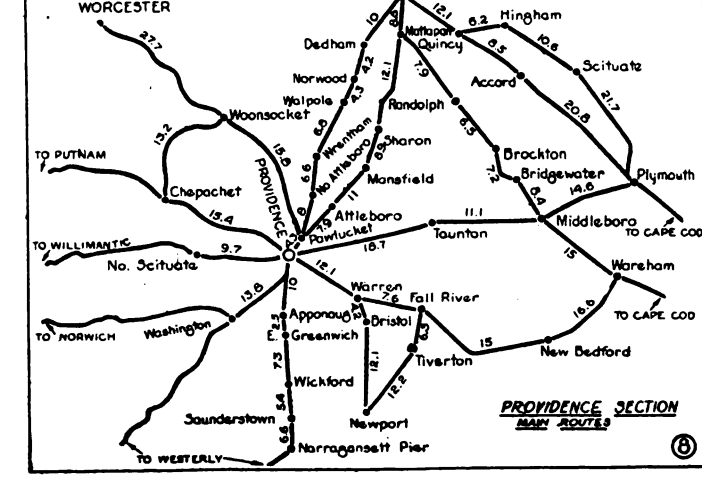
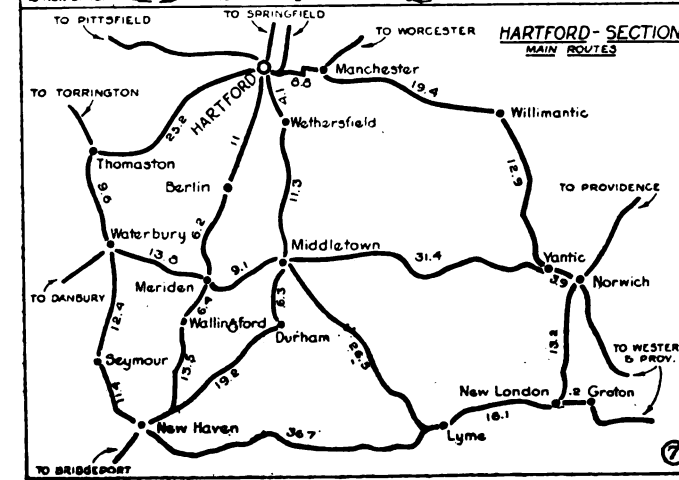
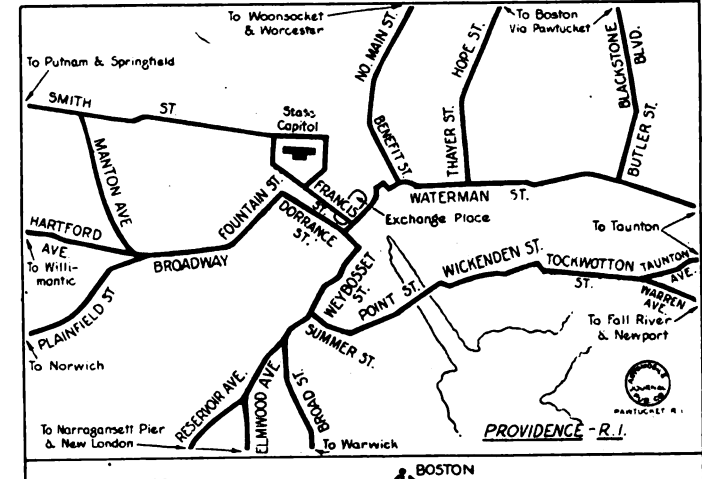
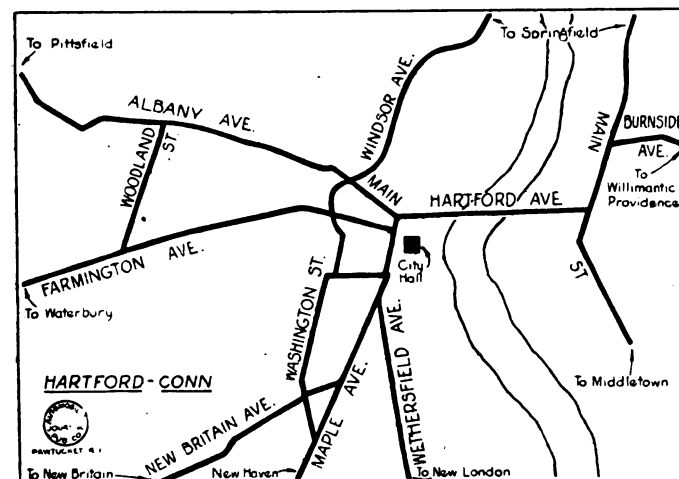
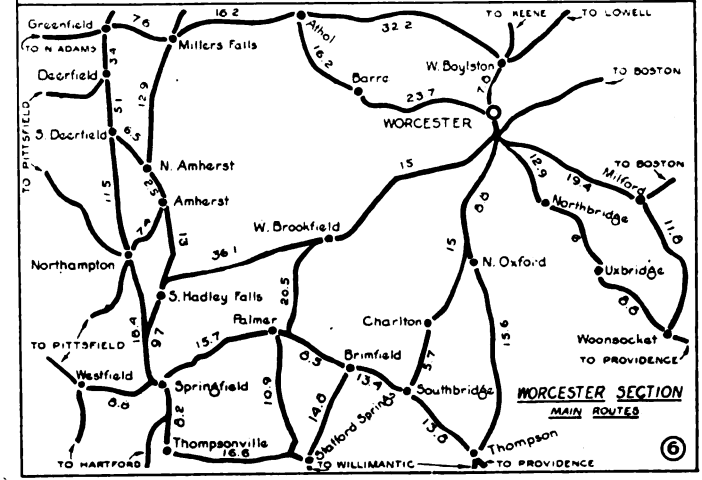
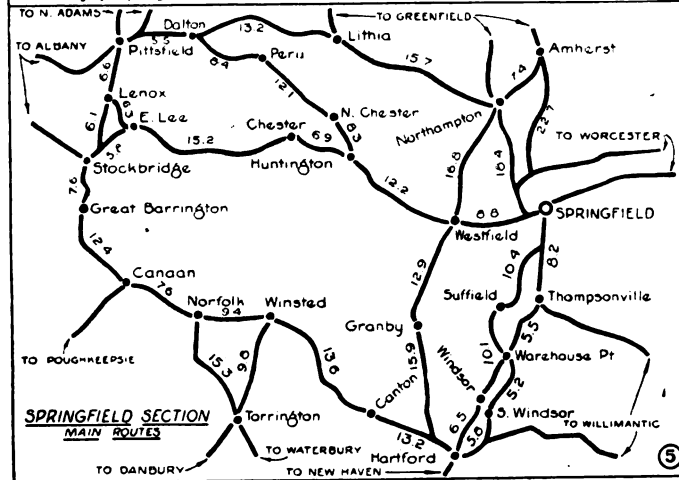
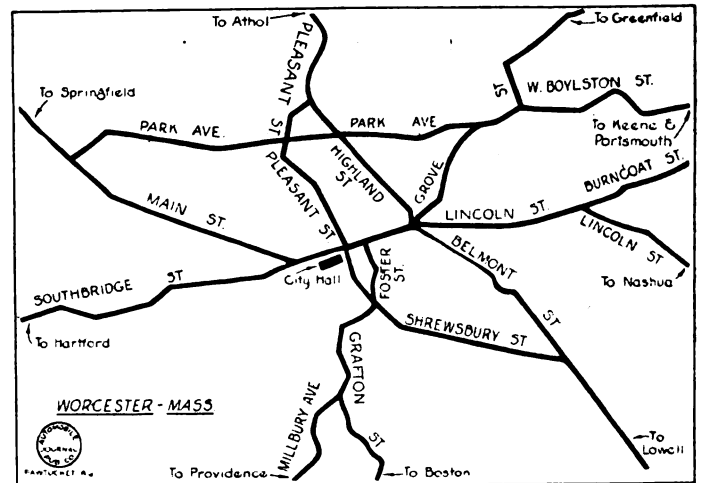
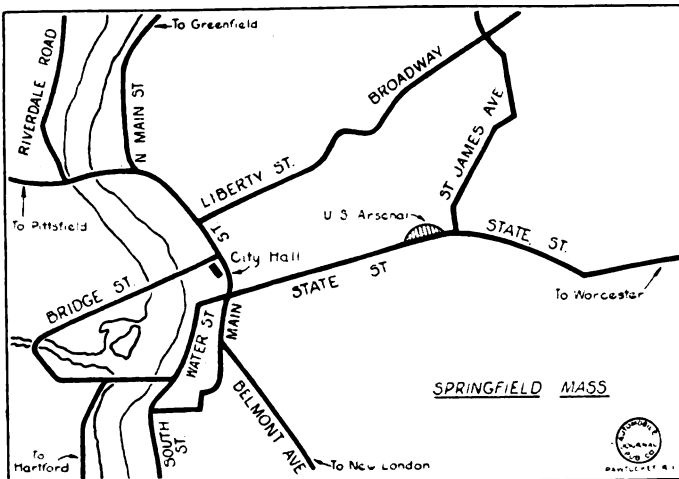
Miles	Miles
Richford . . . 0.0	Danville . . . 72.0
Abercorn . . . 3.0	Warwick . . . 83.7
Sutton Flat . . 9.0	Arthabaska . . 92.0
Sutton Junction 12.0	Stanford . . . 105.0
Brome . . . 16.0	Plessisville . . 110.7
Knowlton . . . 20.0	St. Julie . . . 120.0
Waterloo . . . 30.0	St. Agathe . . . 136.0
Warden . . . 37.0	St. Gilles . . . 145.0
Lawrenceville . 41.0	Craig's Rd. Sta. 154.0
Racine . . . 48.0	St. Romauld . . 170.0
Melbourne . . . 60.0	Levis . . . 176.0
Richmond . . . 61.0	Quebec . . . 176.5

Augusta, Me.-Quebec, P. Q.

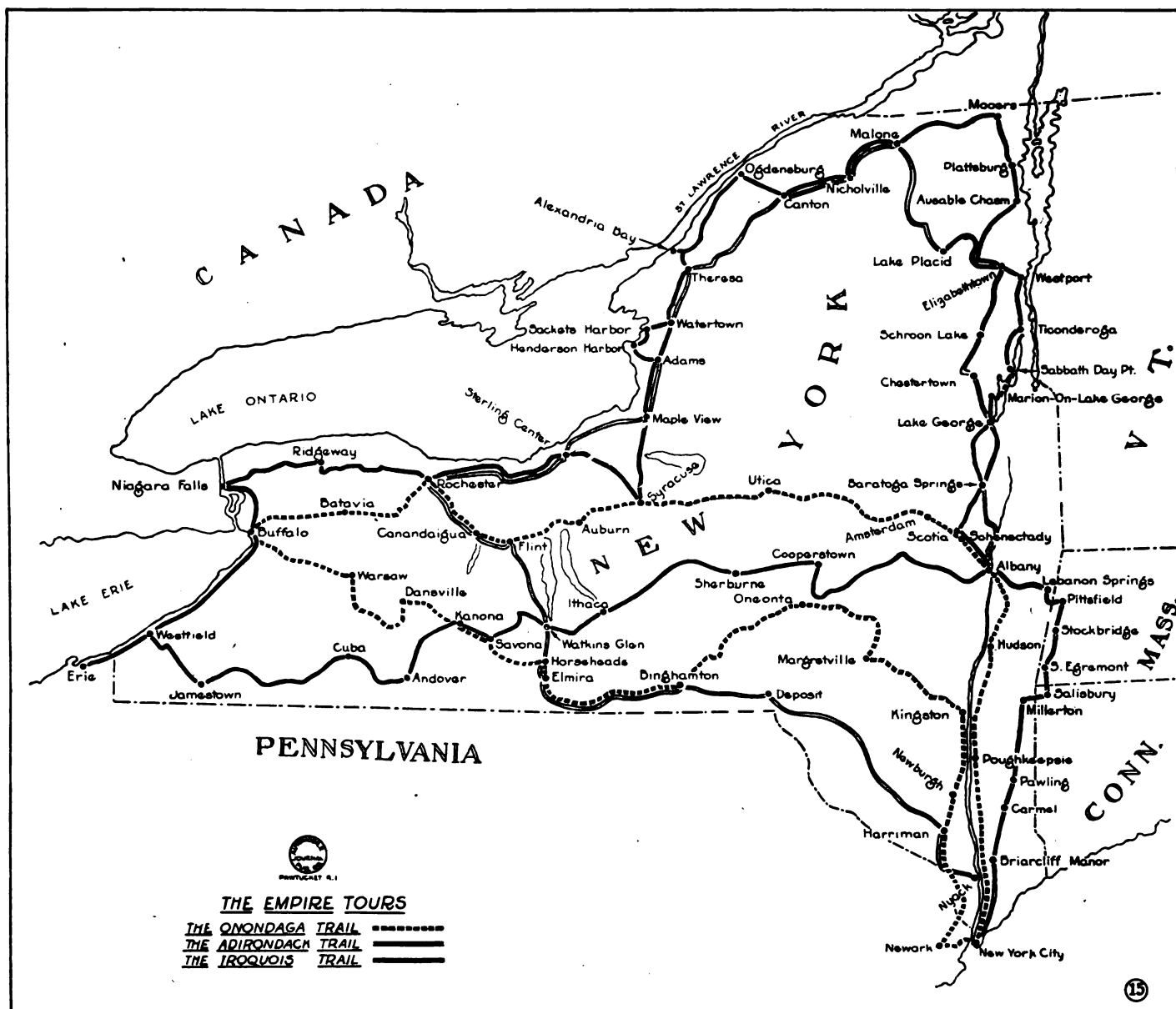
Miles	Miles
Augusta . . . 0.0	Jackman . . . 125.6
Sidney . . . 8.9	Moose River . . 126.8
N. Sidney . . . 12.7	Interna. Line . 139.9
Waterville . . 19.8	Armstrong, P. Q. 141.5
Fairfield . . . 23.2	St. Come . . . 160.7
E. Fairfield . . 30.7	Jersey Mills . . 168.4
Skowhegan . . . 38.3	St. George . . . 170.1
S. Norrgewock . 44.0	Beauceville . . 181.2
Norridgewock . 44.4	St. Joseph . . . 190.6
Madison . . . 52.7	Beauce Junc. . 195.8
North Anson . . 58.0	St. Marie . . . 202.6
Emden . . . 63.2	Scott's Junc. . 208.1
Solon . . . 66.0	St. Henri . . . 221.7
Bingham . . . 74.2	Levis . . . 234.3
Caratunk . . . 89.8	Quebec . . . 234.6
The Forks . . . 97.6	

Calais, Me.-St. John, N. B.

Miles	Miles
Calais . . . 0.0	Musquash . . . 64.3
St. Steph'n, N.B. 0.4	Spruce L. Sta. . 74.0
Oak Bay . . . 7.0	Fairville . . . 78.9
St. George . . 35.8	St. John . . . 81.9
Lepraux . . . 55.7	



NEW YORK STATE SHOWING EMPIRE TOURS



The Empire Tours Are Crowded with Interest. The Above Map Shows the Onondaga, Adirondack and Iroquois Trails. Good Roads Go to Make Up These Tours, and the Scenery Is Splendid Throughout.

THE so-called "Empire Tours," all included within the borders of the State of New York, for practically their entire length are divided into three principal routes covering three old Indian trails known, respectively, as the Adirondack, Onondaga and Iroquois, all of which are plainly shown on the accompanying map, and complete itineraries are also given in the following pages.

Starting from New York City the Adirondack trail winds through the rolling hills of the Berkshires and into the rugged Adirondack mountains, reaching almost to the Canadian line before turning southwest to Rochester; thence it passes back southeast to Nyack, where it strikes the Hudson river.

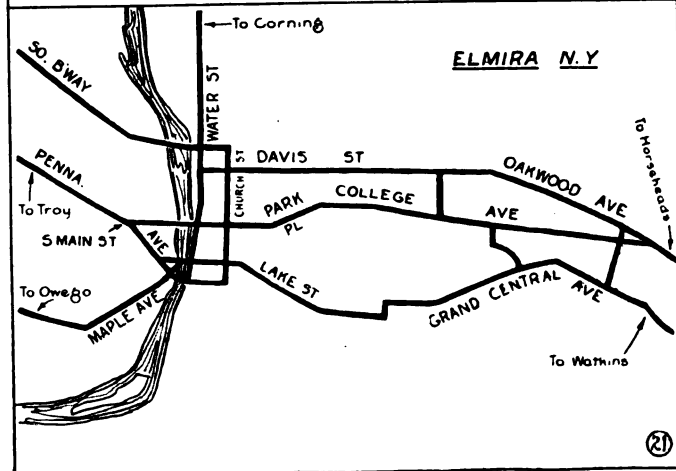
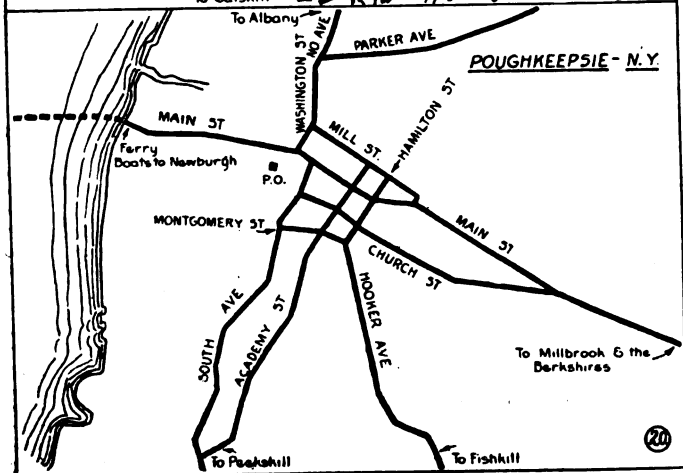
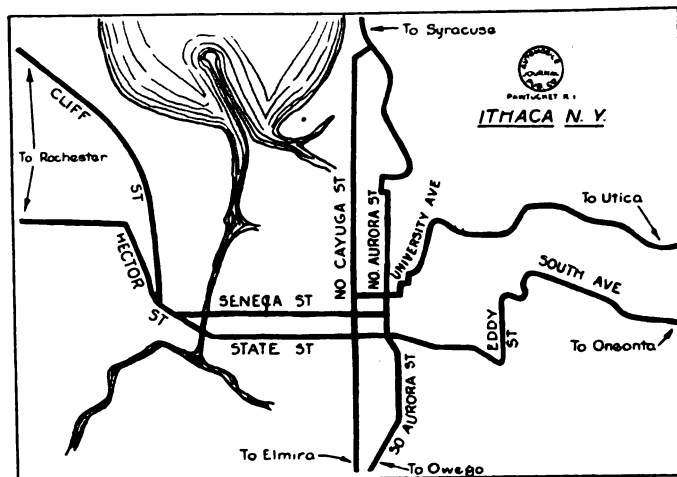
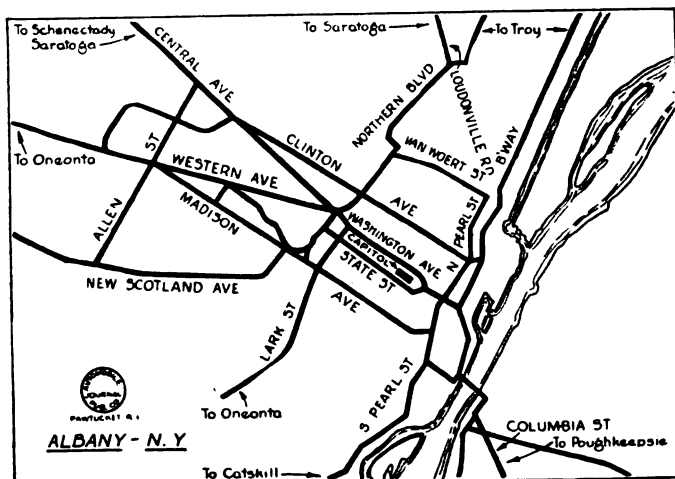
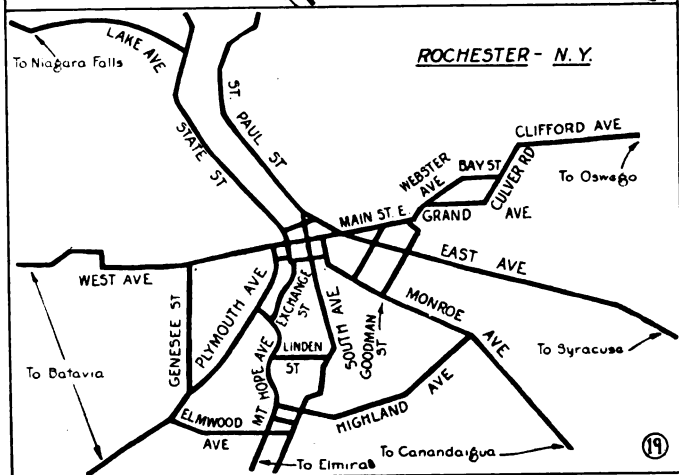
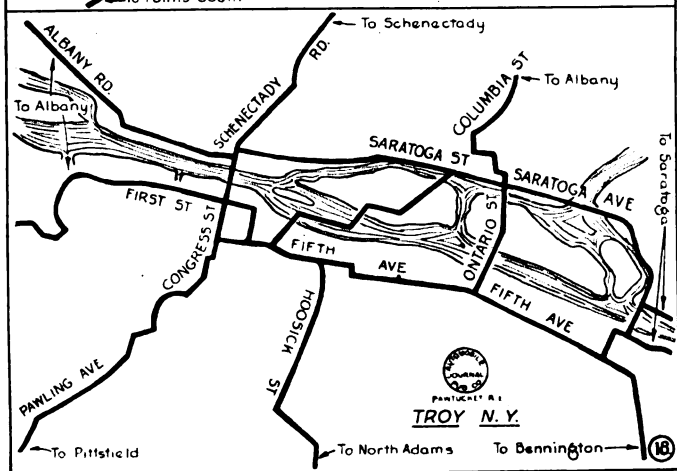
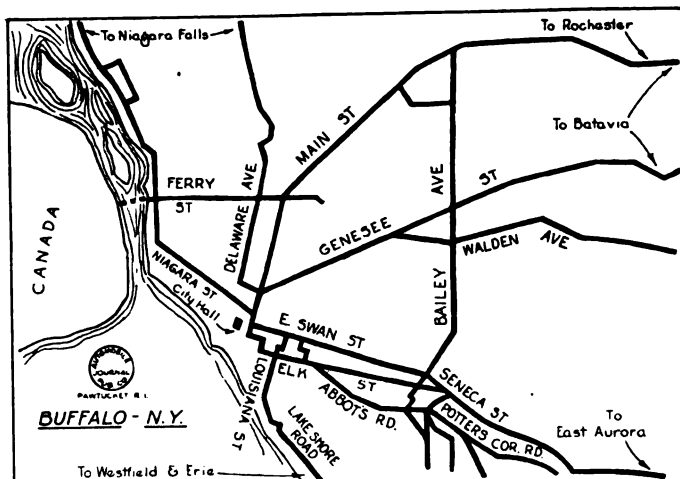
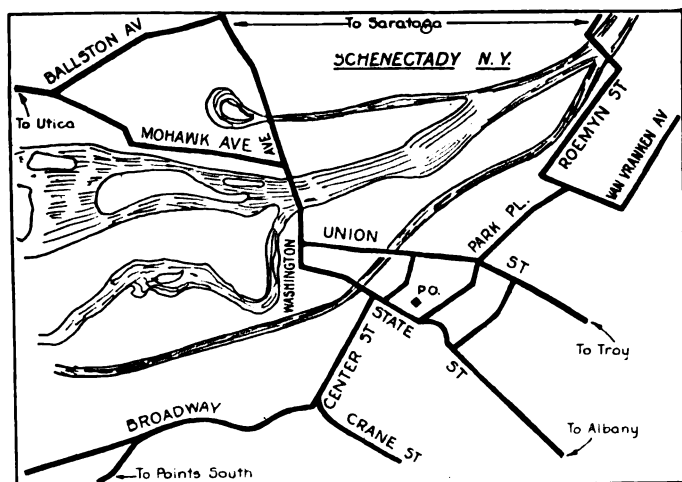
The Onondaga trail also starts from the Metropolis and follows the course of the Hudson river north through Pough-

keepsie to Albany, the state capital. After reaching Schenectady, it swings almost due west to Buffalo on Lake Erie, passing through the important cities of Utica, Syracuse, Auburn and Rochester, as well as the heart of the picturesque Canandaigua lake region. From Buffalo the road is through East Aurora and other places of interest to Elmira, from which city it follows the valleys of the Chemung and Susquehanna rivers to Binghamton. From Binghamton there is a state road to Oneonta, the principal gateway of the Catskills from the west. Passing through these mountains it proceeds to Kingston, and thence southward, entering the Metropolis again by the way of Newark and Jersey City, N. J.

Starting at Erie in the extreme north-western corner of Pennsylvania, the Iroquois trail leads into New York state,

skirting Lakes Erie and Ontario, then up through the Adirondack mountains; thence down to Albany and returning through the Mohawk valley to the starting point. Among the interesting sections traversed by this trail may be mentioned the grape belt of Chautauqua county, Niagara Falls, Lake Champlain, Ausable Chasm, Crown Point, Ticonderoga, Lake George, Saratoga Springs, Ballston Spa, Cooperstown, Lake Cayuga, Ithaca Falls, Watkins Glen, Jamestown and Lake Chautauqua.

Taking these three main routes as a basis, the tourist can cover all parts of the state and can also conveniently swing off into New England and Canada at various points. He is assured of good roads, diversified scenery and satisfactory treatment in the way of hotel accommodations, repair stations, etc.



The Adirondack Trail

New York-Pittsfield.

Miles	Miles
N. Y. (Madison ave. & 43d st.) 0.0	Carmel 58.6
Yonkers 14.4	Patterson 68.2
Hast-on-Hud. 17.9	Pawling 71.8
Dobbs Ferry 18.9	S. Dover 79.6
Irvington 21.4	Dover Plains 85.8
Tarrytown 24.1	Wassale 91.4
Scarboro 28.3	Amenia 94.8
(Onondaga Trail starts here.)	Millerton 103.6
Briarcliff 31.9	Lakeville, Ct. 106.9
Kitchawan 38.0	Salisbury 108.6
Croton Lake St. 38.3	S. Egremont P. O., Mass. 121.6
Yorktown Hts. 42.7	G. Barrington 125.6
Amawalk Sta. 44.4	Stockbridge 133.0
Baldwin P. P. O. 49.4	Lenox 139.8
Lake Mahopac 53.0	Pittsfield 146.4

Pittsfield, Mass.-Saratoga Springs.

Miles	Miles
Pittsfield 0.0	Loudenville 40.7
Shaker Village 4.5	Newtonville 42.0
New Lebanon 10.8	Lathams cors. 43.8

Gabriel Sta. 18.3	Whippleville .. 54.2
Brighton 20.7	Malone 57.6
Paul Smith's ... 21.8	

Malone-Watertown.

Miles	Miles
Malone 0.0	De Kalb Jet 60.4
N. Bangor 5.3	Old De Kalb .. 64.4
Brushton 10.9	Richville 72.0
Molra 13.1	Gouverneur 78.5
Lawrenceville 18.6	Somerville 86.1
Nicholville 24.9	Antwerp 90.8
Hopkinton 27.2	Theresa 102.3
Potsdam 41.5	Pamella 112.3
Watertown 43.5	Watertown 120.9
Eddy 57.3	

Watertown-Oswego.

Miles	Miles
Watertown 0.0	Pulaski 31.7
Adams Center .. 10.0	Maple View 39.4
Adams 13.6	Mexico 43.7
Pierrepont Man. 19.4	New Haven 48.4
Mannville 21.0	Scriba 54.4
Sandy Creek ... 26.0	Oswego 58.8

Elmira-Binghamton.

Miles	Miles
Elmira 0.0	Owego 36.2
Lowman 6.5	Apalachin 43.3
Chemung 12.4	Vestal 49.5
Waverly 17.1	Union 50.2
Fork 17.9	Endicott 52.4
Barton 23.8	Johnson City .. 56.0
Smithboro 26.5	Binghamton ... 58.6
Tloga Center ... 30.5	

Binghamton-Liberty.

Miles	Miles
Binghamton ... 0.0	Horton 63.5
Windsor 15.6	Cook's Falls ... 66.2
Damascus 17.9	Roscoe 72.0
Deposit 31.0	Livingston Man. 78.8
Hale Eddy 35.9	Parkville Sta. 84.2
Hancock 44.3	Liberty 88.2

Liberty-Goshen.

Miles	Miles
Liberty 0.0	Bloomington ... 28.5
Monticello 12.1	Middletown ... 36.7
Wurtsboro 24.1	Goshen 45.1
High View 27.3	

Goshen-New York.

Miles	Miles
Goshen 0.0	Nanuet 35.9
Chester 4.3	Nyack 41.0
Monroe 9.2	Tarrytown 41.8
Harriman 11.5	Irvington 44.5
Southfields 16.7	Dobbs Ferry 46.0
Tuxedo 20.8	Hastings 47.8
Sloatsburg 23.5	Yonkers 52.0
Suffern 27.6	43d and Madison ave., N. Y. C. 65.6
Monsey 32.2	
Spring Valley .. 33.4	

NIAGARA FALLS TOUR.

New York-Poughkeepsie.

Miles	Miles
New York 0.0	Harmon 32.7
Yonkers 14.4	Croton 33.8
Hast-on-Hud. 17.9	Peekskill 41.5
Dobbs Ferry 18.9	Fishkill Village 60.9
Irvington 21.4	Wap's Falls 66.0
Tarrytown 24.1	Poughkeepsie .. 73.7
Ossing 30.0	

Poughkeepsie-Albany.

Miles	Miles
Poughkeepsie .. 0.0	Blue Stores 30.8
Hyde Park 6.2	Livingston 34.0
Staatsburg 10.2	Hudson 42.3
Rhinebeck 16.3	Stockport 48.2
Red Hook 21.7	Stuyvesant Falls 51.7
Up. Red Hook .. 24.4	Kinderhook 54.9
Neville 27.0	Valatie 56.0
Clermont 28.9	E. Greenbush ... 54.9
(Adirondack Trail Starts Here.)	
Rensselaer 74.4	Albany 75.3

Albany-Utica.

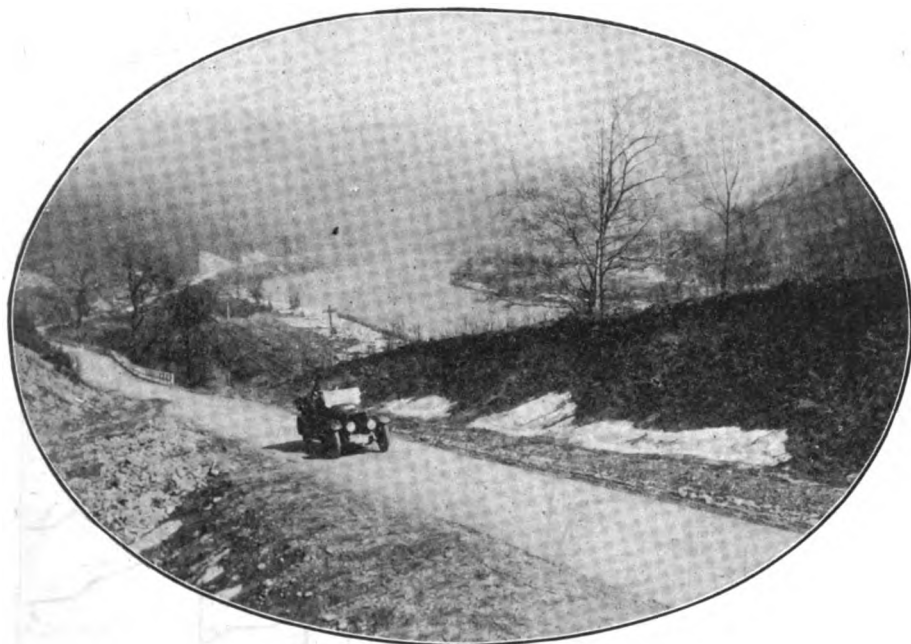
Miles	Miles
Albany 0.0	Nelliston 56.0
Schenectady .. 14.9	St. Johnsville .. 61.9
Scotia 16.5	Little Falls 72.2
Amsterdam 30.8	Herkimer 79.3
Fort Johnson .. 33.7	Mohawk 80.9
Tribes Hill 36.1	Ithaca 82.5
Fonda 41.5	Frankfort 85.0
Palatine Bridge 53.1	Utica 94.6

Utica-Syracuse.

Miles	Miles
Utica 0.0	Chittenango 34.0
New Hartford .. 3.0	Mycenae 37.3
Vernon 16.5	Manlius Center 41.3
Oneida Castle .. 21.7	East Syracuse .. 45.1
Wampsville 24.9	Syracuse 45.9
Canastota 27.3	

Syracuse-Rochester.

Miles	Miles
Syracuse 0.0	Flint 57.9
Camillus 8.3	Hopewell 60.0
Elbridge 15.3	Canandaigua ... 67.4
Sennett 20.4	Victor 77.6
Auburn 25.4	Mendon 83.0
Seneca Falls .. 40.1	Pittsford 89.6
Watertown 43.5	Rochester 97.3



On the Road to Binghamton the Highway Lies Over Hills and Through Valleys Along the Susquehanna River.

N. Leb. Center. 12.2	Cohoes 48.2
West Lebanon 14.9	Waterford 50.1
Nassau 23.5	Mechanicville .. 58.9
E. Greenbush .. 30.8	Maltaville 64.8
Rensselaer 35.2	Malta 67.0
Albany 36.0	Saratoga Spgs. 75.1

Saratoga-Schroon Lake.

Miles	Miles
Saratoga 0.0	Warrensburg ... 34.2
Wilton 7.4	Chestertown ... 46.2
S. Glen Falls .. 17.8	Potterville 55.0
Glen Falls 18.7	Taylor-on-Schroon Lake 58.7
French Mount .. 24.0	Schroon Lake .. 54.3
Lake George ... 28.1	

Schroon Lake-Lake Placid.

Miles	Miles
Schroon Lake .. 0.0	Jay 53.3
Schroon River .. 9.3	Wilmington 58.0
Euba Mills 21.4	Wilmington Notch 58.4
Elizabethtown .. 31.5	Newman 70.8
Keene 43.6	Lake Placid ... 71.4
Upper Jay 49.7	

Lake Placid-Malone.

Miles	Miles
Lake Placid ... 0.0	McCulloms 28.4
Saranac Lake .. 9.5	Duane Center .. 40.3

Oswego-Rochester.

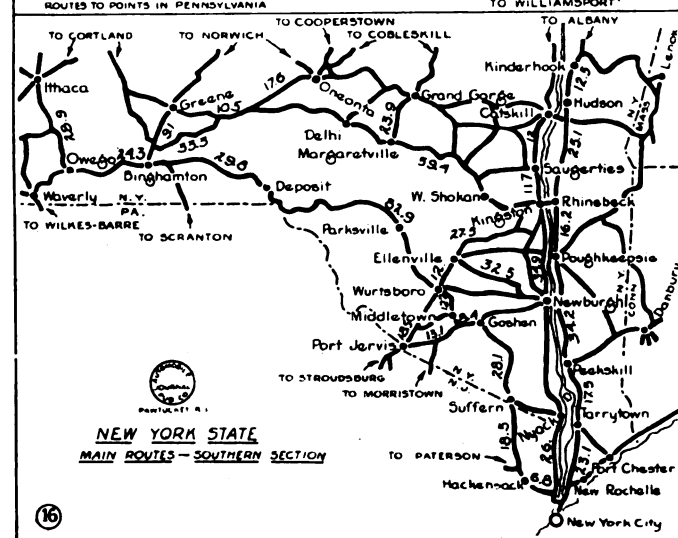
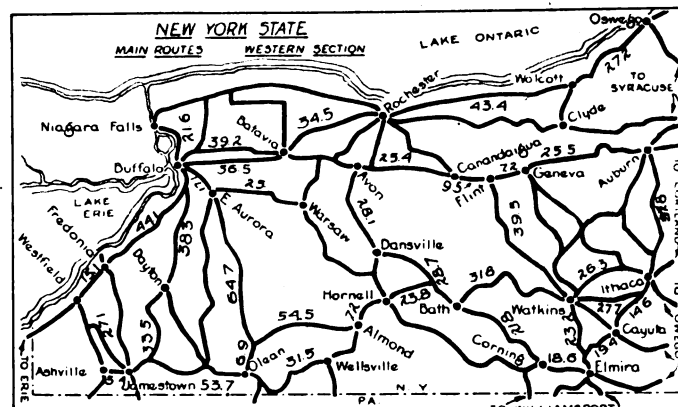
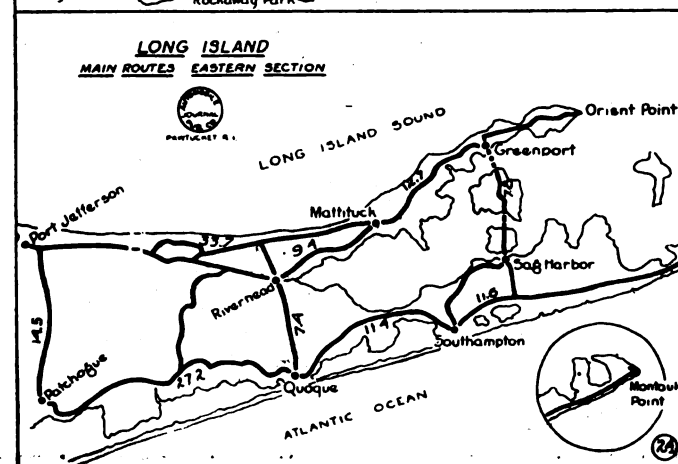
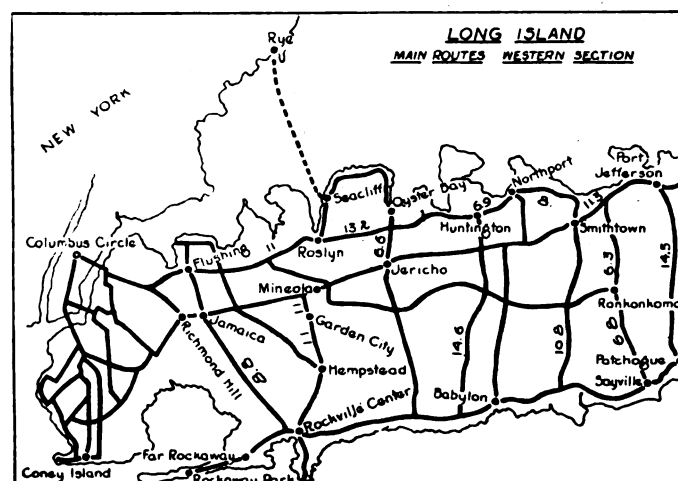
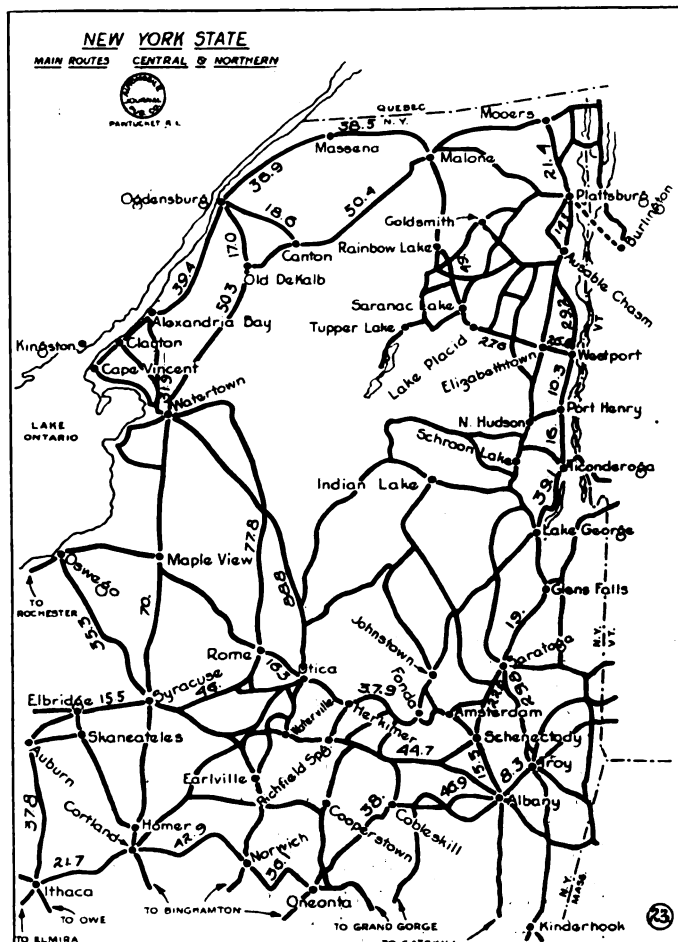
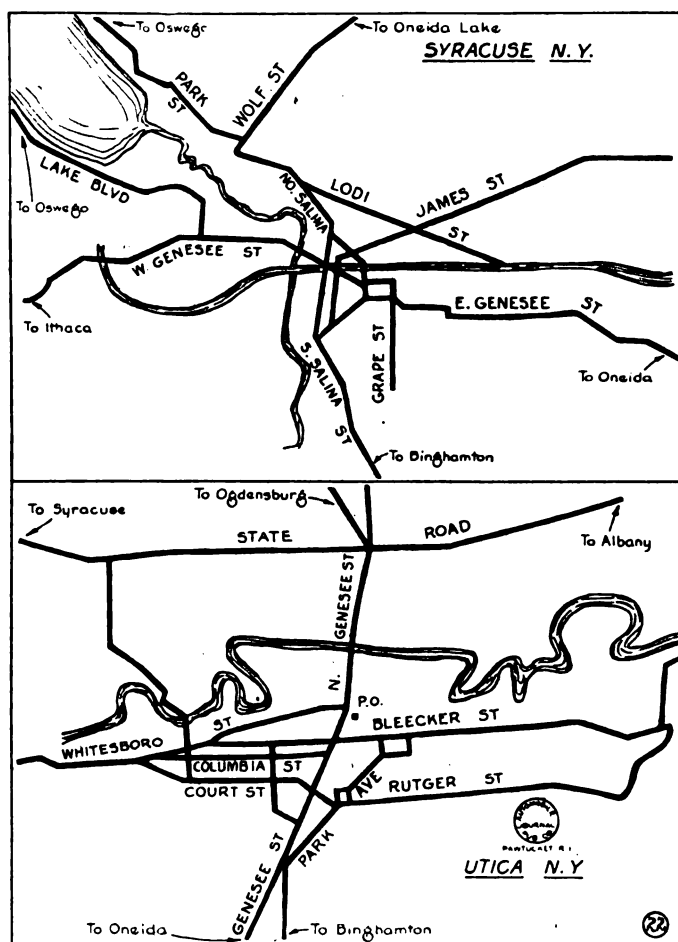
Miles	Miles
Oswego 0.0	Williamson 48.1
Sterling Center 12.7	Ontario 53.1
Red Creek 21.2	Ontario Center 54.4
Wolcott 27.0	Fruitland P. O. 56.9
Alton 36.8	Union Hill 57.9
Wallington Sta. 38.6	Webster 60.8
Sodus 41.3	W. Webster 64.1
E. Williamson .. 45.6	Rochester 72.1

Rochester-Watkins.

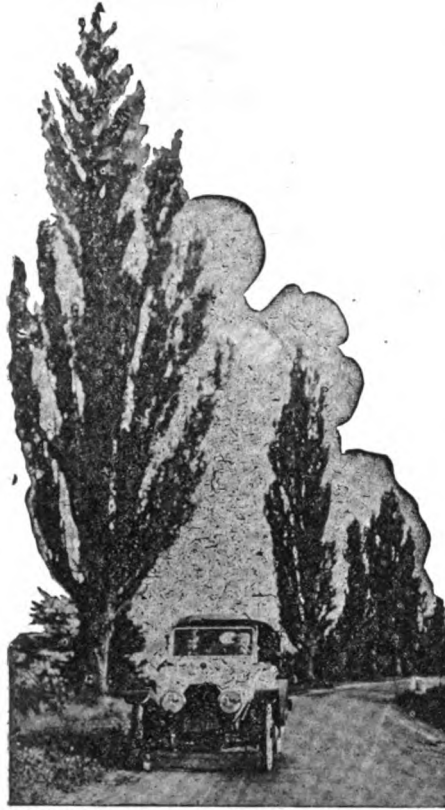
Miles	Miles
Rochester 0.0	Stanley 42.0
Pittsford 7.8	Halls Corners .. 45.6
Mendon 14.1	Benton Center .. 50.6
Victor 19.4	Penn Yan 54.6
Canandaigua ... 29.8	Dundee 66.6
Hopewell 37.3	Reading Center 74.6
Flint 39.3	Watkins 79.7

Watkins-Elmira.

Miles	Miles
Watkins 0.0	Horseheads 16.4
Montour Falls .. 2.9	Elmira Hts. Sta. 19.1
Millport 9.3	Elmira 22.2
Pine Valley 12.0	



The Onondaga Trail



Beautiful Trees Line the Roadways for Miles in the Lake Country.

New York-Poughkeepsie.

Miles		Miles
New York..... 0.0	Harmon..... 32.7	
Yonkers..... 14.4	Croton..... 33.8	
Hast-on-Hud.. 17.9	Peekskill..... 41.5	
Dobbs Ferry... 18.9	Fishkill Village 60.9	
Irvington..... 21.4	Wap-gers Falls 66.0	
Tarrytown..... 24.1	Poughkeepsie... 73.7	
Ossing..... 30.0		

Poughkeepsie-Albany.

Miles		Miles
Poughkeepsie.. 0.0	Blue Stores..... 30.8	
Hyde Park..... 6.2	Livingston..... 34.0	
Staatsburg..... 10.2	Hudson..... 42.3	
Rhinebeck..... 16.3	Stockport..... 48.2	
Red Hook..... 21.7	Stuyv-sant Falls 51.7	
Up. Red Hook.. 24.4	Kinderhook..... 54.9	
Nevls..... 27.0	Valatie..... 56.0	
Clermont..... 28.9	E. Greenbush... 54.9	
(Adirondack Trail Starts Here.)		
Rensselaer..... 74.4	Albany..... 75.3	

Albany-Utica.

Miles		Miles
Albany..... 0.0	Nelliston..... 56.0	
Schenectady... 14.9	St. Johnsville... 61.9	
Scotia..... 16.5	Little Falls..... 72.2	
Amsterdam..... 30.8	Herkimer..... 79.3	
Fort Johnson.. 33.7	Mohawk..... 80.9	
Tribes Hill.... 36.1	Ilion..... 82.5	
Fonda..... 41.5	Frankfort..... 85.0	
Palatine Bridge 53.1	Utica..... 94.6	

Utica-Syracuse.

Miles		Miles
Utica..... 0.0	Chittenango.... 34.0	
New Hartford.. 3.0	Mycenae..... 37.3	
Vernon..... 16.5	Manlius Center 41.3	
Ononda Castle.. 21.7	East Syracuse.. 45.1	

Wampsville.... 24.9	Syracuse..... 45.9
Canastota..... 27.3	

Syracuse-Rochester.

Miles		Miles
Syracuse..... 0.0	Flint..... 57.9	
Camillus..... 8.3	Hopewell..... 60.0	
Elbridge..... 15.3	Canandaigua... 67.4	
Sennett..... 20.4	Victor..... 77.6	
Auburn..... 25.4	Mendon..... 83.0	
Seneca Falls.. 40.1	Pittsford..... 89.6	
Waterloo..... 43.5	Rochester..... 97.2	
Geneva..... 51.0		

Rochester-Buffalo.

Miles		Miles
Rochester..... 0.0	Patavia..... 37.3	
Scottsville... 12.4	East Pembroke. 43.4	
Garbutt..... 14.7	Pembroke..... 50.3	
Mumford..... 18.9	Clarence..... 58.3	
Caldonia..... 20.2	Williamsville.. 64.2	
LeRoy..... 27.3	Snyder..... 68.2	
Stafford..... 31.4	Buffalo..... 75.9	

Buffalo-Dansville.

Miles		Miles
Buffalo..... 0.0	Rock Glen..... 47.0	
Ebenezer..... 7.9	Silver Springs.. 51.1	
E. Aurora..... 17.5	Castile..... 54.9	
Varysburg..... 32.8	Portageville... 59.9	
Orangeville... 36.4	Hunts..... 64.4	
Halls Corners. 39.1	Canaseraga..... 78.4	
Warsaw..... 42.3	Dansville..... 83.9	

Dansville-Elmira.

Miles		Miles
Dansville..... 0.0	Campbell..... 41.5	
Wayland..... 6.3	Coopers..... 46.2	
Cohocton..... 14.7	Painted Post... 49.3	
Avoca..... 22.4	Corning..... 51.8	
Kanona..... 26.8	Big Flats..... 58.7	
Bath..... 30.6	Elmira Hts..... 65.3	
Savona..... 37.0	Elmira..... 70.6	

Elmira-Binghamton.

Miles		Miles
Elmira..... 0.0	Owego..... 36.2	
Lowman..... 6.5	Apalachin..... 43.3	
Chemung..... 12.4	Vestal..... 49.5	
Waverly..... 17.1	Union..... 50.2	
Barton..... 23.8	Endicott..... 52.4	

Smithboro..... 26.5	Johnson City... 54.0
Tloga Center.. 30.5	Binghamton..... 58.6

Binghamton-Oneonta.

Miles		Miles
Binghamton... 0.0	Bainbridge..... 33.2	
Port Crane.... 7.3	Sidney..... 39.4	
Sanitaria Spgs. 10.9	Unadilla..... 43.4	
Relden..... 16.8	Wells Bridge... 49.2	
Harpurville... 20.3	Otego..... 53.6	
Nineveh..... 22.1	Oneonta..... 61.8	
Afton..... 27.4		

Oneonta-Kingston.

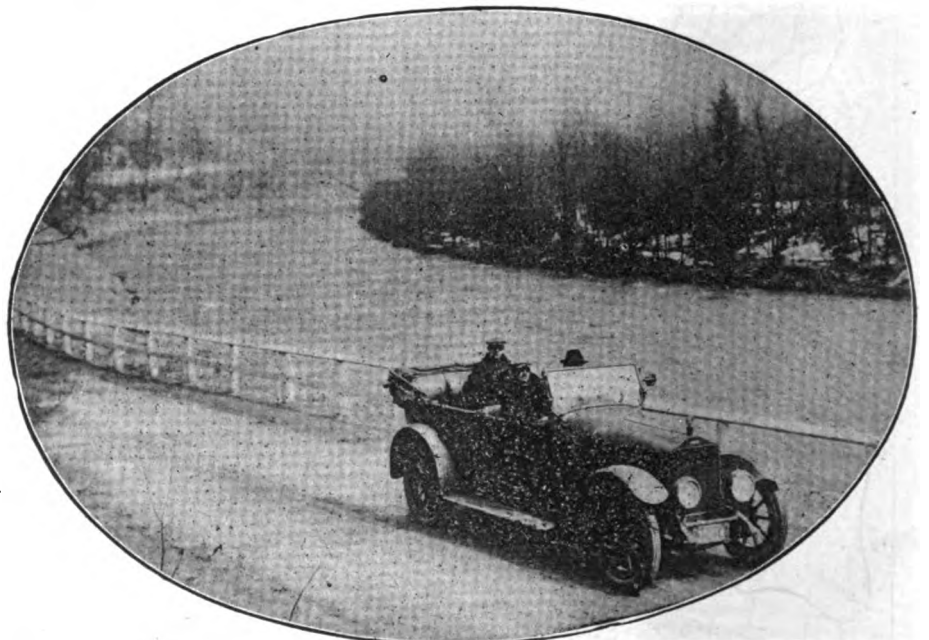
Miles		Miles
Oneonta..... 0.0	Highmont..... 62.8	
Davenport Gen. 8.6	Pine Hill..... 64.9	
Davenport..... 13.0	Shandaken..... 69.8	
Harpersfield.. 22.5	Allagen..... 71.4	
Stamford..... 27.0	Phoenicia..... 75.7	
Grand Gorge.. 35.0	Mt. Pleasant... 79.5	
Roxbury..... 42.4	Boiceville..... 83.0	
Halcotville... 48.6	Shokan..... 86.9	
Kelley Cors... 50.5	Ashokan..... 87.8	
Margaretville. 54.2	West Hurley... 94.2	
Arkville..... 55.7	Kingston..... 101.0	
Fleischmanns. 60.6		

Kingston-Newburgh.

Miles		Miles
Kingston..... 0.0	Highland..... 16.9	
Bondout..... 2.4	Milton..... 21.3	
Port Ewen..... 3.2	Mariboro..... 25.3	
Ulster Park... 6.6	Middle Hope... 29.0	
Esopus..... 9.0	Newburgh..... 33.3	

Newburgh-New York.

Miles		Miles
Newburgh..... 0.0	Ramsey..... 37.2	
Vails Gate..... 4.8	Allendale..... 39.1	
Woodbury..... 12.2	Hookhous..... 41.5	
Highland Mills 13.9	Arcoia..... 47.0	
Central Valley 15.1	Hasbrouck Hts. 52.8	
Harriman Sta. 17.0	Rutherford..... 55.4	
Southfields... 22.0	W. Arlington... 59.8	
Tuxedo..... 26.1	Newark..... 63.7	
Sloatsburg... 28.8	Jersey City.... 69.1	
Suffern..... 32.9	New York..... 74.9	
Mahwah..... 34.6		



A Beautiful Highway Winds Along the Picturesque Beaver Kill River for Many Miles Near Horton.

The Iroquois Trail

Erie, Pa.-Buffalo, N. Y.

Miles	Miles
Erie..... 0.0	Irving..... 60.7
Harbour Creek 8.2	Farnham..... 62.7
Moorheadville.. 11.0	Brant..... 66.6
North East, Pa. 15.2	Angola..... 70.2
Ripley, N. Y.... 22.7	Evans..... 71.7
Forsyth..... 26.3	Jerusalem Cors. 73.8
Westfield..... 30.5	Wanakah..... 80.9
Portland..... 37.4	Lake View..... 82.6
Brocton..... 38.9	Athol Springs.. 83.8

Ogdensburg-Malone.

Miles	Miles
Ogdensburg... 0.0	Lawrenceville.. 52.2
Canton..... 18.5	Molra..... 57.7
Potsdam..... 29.3	Brushton..... 59.9
Hopkinton.... 43.6	N. Bangor..... 65.5
Nicholville.... 45.9	Malone..... 70.8

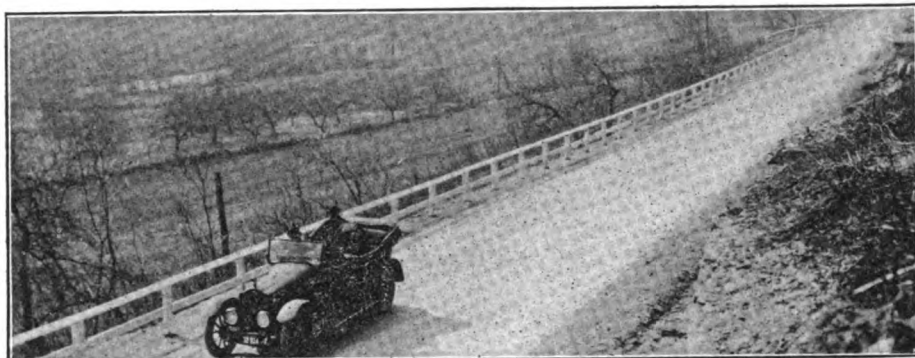
Malone-Plattsburg.

Miles	Miles
Malone..... 0.0	Moers..... 39.8

Ballston Lake. 13.6	Woodlawn..... 26.6
Burnt Hills... 14.6	Albany..... 38.4

Albany-Cooperstown.

Miles	Miles
Albany..... 0.0	Richmondville.. 52.8
Delmar..... 5.4	E. Worcester... 59.8
Clarksville.... 13.5	Worcester..... 64.5
E. Berne..... 21.3	Schenectus..... 69.8
Berne..... 25.0	Maryland..... 73.2
W. Berne..... 27.8	Cooper'tn June. 78.6
Gallupville.... 31.7	Colliersville... 79.7
Vrooman's Cor. 35.6	Portlandville... 83.4
Central Bridge 39.0	Milford..... 87.9
Cobleskill..... 47.8	Cooperstown... 96.2
Warnerville.... 49.1	



Steep Grade Near Monticello, N. Y., on an Unsurpassed Highway.

Lamberton..... 41.7	Bay View..... 84.8
Fredonia..... 45.6	Wood's Beach. 86.1
Sheridan..... 51.5	Buffalo..... 93.0
Silver Creek... 57.3	

Buffalo-Niagara.

Miles	Miles
Buffalo..... 0.0	Niagara Falls.. 26.4
St. Johnburg.. 16.2	

Niagara Falls-Rochester.

Miles	Miles
Niagara Falls. 0.0	Albion..... 57.3
Pekin..... 13.6	Holly..... 66.9
Cambria..... 20.6	Brockport.... 72.0
Wright's Cors.. 26.8	Clarkson..... 73.1
Ridge Rd. Vil.. 29.5	Garland..... 75.0
Hartland..... 33.3	Parma..... 80.0
Johnson Creek. 36.1	W. Greece..... 81.9
Jeddo..... 39.5	Greece..... 84.9
Ridgeway..... 42.8	Uptonville Sta. 88.2
Medina..... 46.5	Rochester..... 91.4

Rochester-Syracuse.

Miles	Miles
Rochester..... 0.0	Wolcott..... 45.1
W. Webster... 8.0	Red Creek..... 50.9
Webster..... 11.3	Bear Haven... 56.1
Fruitland..... 16.1	Sterling Center 59.4
Ontario Center 17.7	Hannibal..... 63.1
Ontario..... 19.0	Granby Center. 68.8
Williamson... 24.0	Fulton..... 71.9
E. Williamson. 26.5	Phoenix..... 80.8
Sodus..... 30.8	Three River Pt. 83.0
Wallington... 33.5	Liverpool..... 91.1
Alton..... 35.3	Syracuse..... 96.0

Syracuse-Watertown.

Miles	Miles
Syracuse..... 0.0	Mannsville.... 47.5
Cicero..... 9.4	Pierrepont Man. 49.1
Brewerton P. O. 13.8	Adams..... 54.9
Hastings Cent'r 19.3	Roberts Cor... 60.3
Hastings P. O. 23.2	Henderson..... 64.4
Colosse..... 26.5	Henderson Har. 66.6
Maple View... 29.1	Sackett's Harbor 75.1
Pulaski..... 36.8	Watertown.... 85.5
Sandy Creek... 42.5	

Watertown-Ogdensburg.

Miles	Miles
Watertown..... 0.0	Oakvale..... 45.2
Pamella..... 8.7	Hammond..... 49.0
Theresa..... 18.6	Briarhill..... 55.3
Pleasant..... 24.2	Morristown.... 59.5
Alexandria Bay 39.3	Ogdensburg.... 70.5
Redwood..... 37.3	

Burek..... 7.3	Sciota..... 44.8
Chateaugay.... 12.3	W. Chazy..... 50.6
Ellenburg Cen. 25.0	Beekmantown.. 54.2
Ell'burg Depot 27.7	E. Beek'town.. 56.1
Moers Forks.. 36.7	Plattsburg.... 60.7

Plattsburg-Elizabethtown.

Miles	Miles
Plattsburg..... 0.0	Jay..... 32.6
Ausable Chasm 13.2	Upper Jay..... 36.2
Keeseville.... 15.3	Keene..... 42.3
Clintonville... 21.2	Elizabethtown. 54.4
Ausable Forks. 26.7	

Elizabethtown-Saratoga.

Miles	Miles
Elizabethtown. 0.0	Bolton..... 51.8
Westport..... 9.1	Marion-on-Lake 54.2
End of road... 18.9	George..... 54.2
Port Henry.... 19.2	Diamond Point. 55.9
Fork..... 19.5	Lake George... 59.8
Crown Point... 26.5	Luzerne..... 71.8
Ticonderoga... 35.1	Corinth..... 77.4
Hague..... 44.1	S. Corinth..... 81.5
Silver Bay.... 47.8	Greenfield Cen. 86.3
Sabbath Day Pt. 49.9	Saratoga Spgs. 91.6
Bt. Ld for Bol'n 50.0	

Saratoga-Albany.

Miles	Miles
Saratoga Spgs. 0.0	Scotia..... 21.8
Ballston Spa... 6.8	Schenectady... 23.3

Watkins-Hornell.

Miles	Miles
Watkins..... 0.0	Bath..... 29.6
Tyrone..... 9.9	Kanona..... 33.4
Bradford..... 14.6	Howard..... 42.3
Sonora..... 18.8	Hornell..... 53.6
Savona..... 23.3	

Hornell-Jamestown.

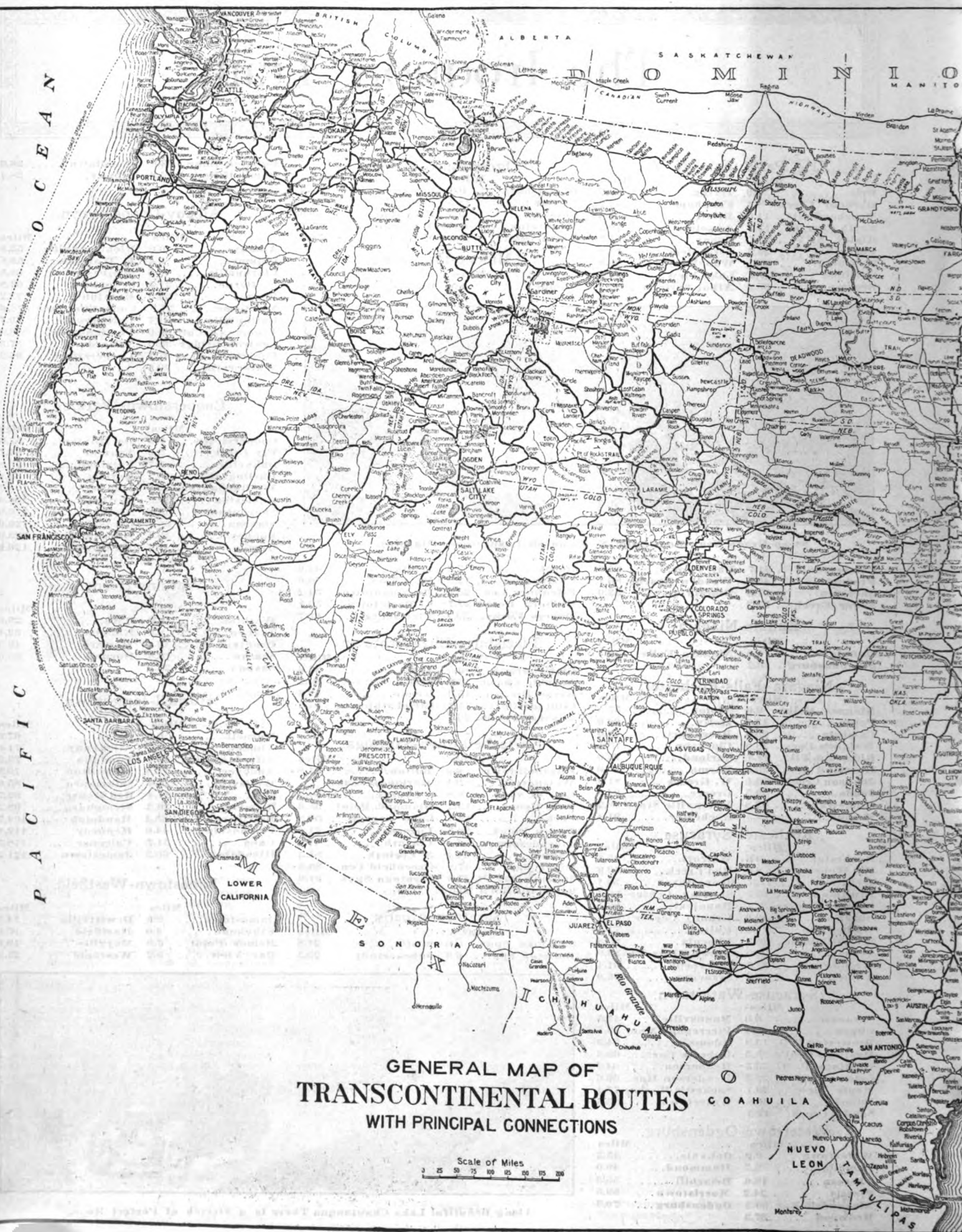
Miles	Miles
Hornell..... 0.0	Olean..... 67.0
Almond..... 5.3	Alleghany..... 71.0
Alfred Station. 9.1	Vandalia..... 75.9
Andover..... 17.8	Carrollton.... 79.9
Wellsville.... 26.6	Salamanca.... 85.9
Scioto..... 31.4	Red House..... 92.7
Belmont..... 36.3	Steamburg.... 98.2
Belvidere..... 39.4	Randolph..... 104.7
Friendship.... 44.0	Kennedy..... 112.1
Cuba..... 51.7	Falcomer..... 118.5
Hinsdale..... 60.2	Jamestown.... 121.2

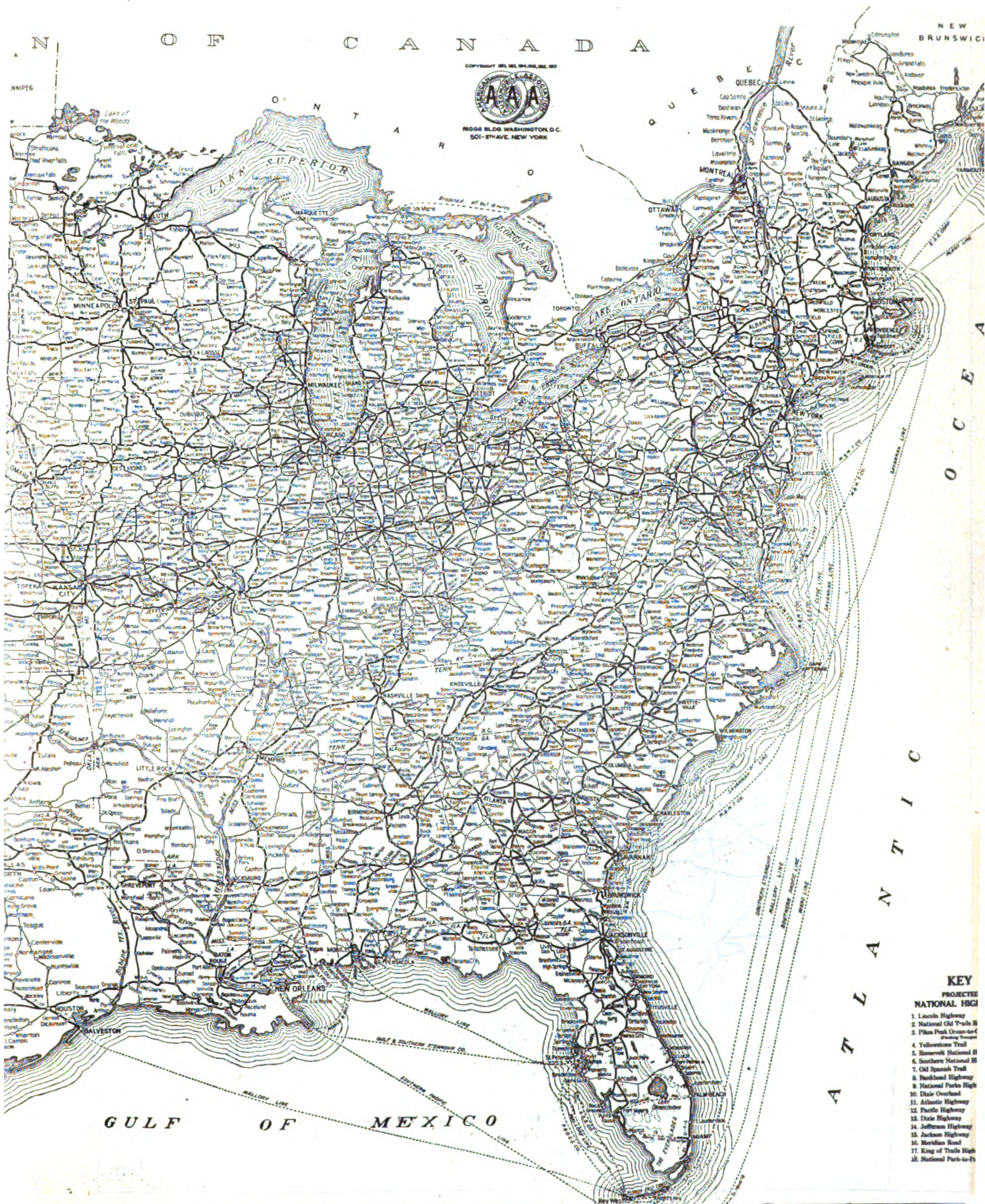
Jamestown-Westfield.

Miles	Miles
Jamestown.... 0.0	Dewittville.... 14.3
Fluvanna..... 4.0	Hartfield..... 17.0
Bemus Point.. 7.9	Mayville..... 19.0
Bay View..... 9.2	Westfield.... 25.3

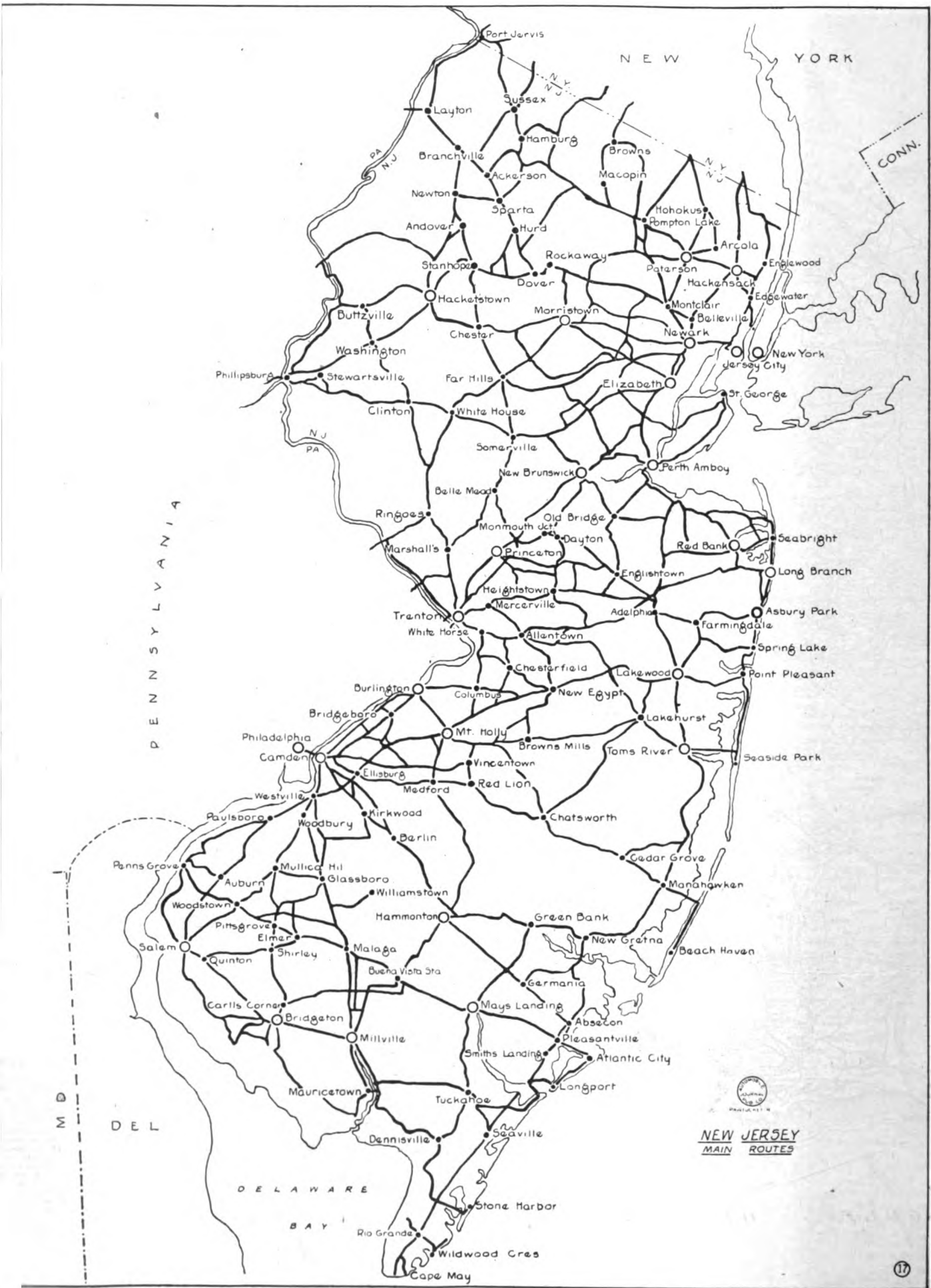


Along Beautiful Lake Chautauqua There Is a Stretch of Perfect Road.





- KEY**
PROJECTED
NATIONAL HIGH
1. Lincoln Highway
 2. National Old Trails Road
 3. Pike's Peak Ocean-to-Ocean Highway
 4. Yellowstone Trail
 5. Roosevelt National Highway
 6. Southern National Highway
 7. Old Spanish Trail
 8. Dixie Highway
 9. National Parks Highway
 10. Dixie Overland
 11. Atlantic Highway
 12. Pacific Highway
 13. Dixie Highway
 14. Jefferson Highway
 15. Jackson Highway
 16. Meridian Road
 17. King of Trails Highway
 18. National Parks-to-Peak



GENERAL INDEX

ALTHOUGH in preparing the various maps and itineraries the purpose has been to make them as largely self-explanatory as possible, in order that the tourist may, perhaps, be able to better utilize them, a brief explanation may be of service.

The General Index given herewith includes places mentioned in the various itineraries, the folios referring to the pages on which they may be found. Cities, states and sections having special maps will be so denoted in the index.

It will be noted that on the large general map, pages 40 and 41, each of the national highways is keyed by number, and any tourist desiring to proceed from his city to some other point can select the route best suited to his needs and readily trace it on the general map and, in the sections covered by state, sectional and city maps, will find his itinerary shown more in detail. The smaller charts and city maps are, it will be seen, practically self-explanatory, as the roads to the principal adjacent cities are plainly marked so that the tourist coming in from any one of them will be able to utilize the more detailed maps when reaching the border.

A

	Page
Abbottstown, Pa.	19, 49
Aberdeen, Md.	52
Aberdeen, S. D.	20
Ablington, Pa.	52
Absecon, N. J.	49
Accotink, Va.	51
Ada, O.	19
Adams, Mass.	29
Adams, N. Y.	36, 39
Adamsburg, Pa.	19, 51
Adams Center, N. Y.	20
Addison, N. Y.	20
Addison, Pa.	51
Addison, W. Va.	23
Adelphi, N. J.	49
Adirondack Mountains	34
Adirondack Trail, Map	34
Adirondack Trail	36, 38
Afton, N. Y.	20, 38
Akron, O.	20
Alameda, N. M.	23
Albany, Ga.	24
Albany, N. Y., Map	35
Albany, N. Y.	32, 34, 36, 38, 39
Albion, N. Y.	39
Albuquerque, N. M.	23
Alda, Neb.	19
Alexandra, Pa.	21
Alexandria Bay, N. Y.	39
Alfred Station, N. Y.	20, 39
Algodones, N. M.	23
Allagen, N. Y.	38
Alleghany, N. Y.	39
Allendale, N. Y.	38
Allenhurst, N. J.	49
Allentown, Pa.	21
Allston, Mass.	31
Almond, N. Y.	20, 39
Alpena, Mich.	24
Alpine, N. Y.	39
Alpine, Utah	21
Alpine Ranch, Nev.	19
Alta, Cal.	19
Altamont, Cal.	19
Altamont, Ind.	23
Altam, N. Y.	34, 39
Altam, O.	23

	Page
Altoona, Pa.	21
Amawalk Station, N. Y.	36
Ambler, Pa.	51
Amboy, Cal.	23
Ambridge, Pa.	19
Amenia, N. Y.	20, 36
Americus, Ga.	24
Ames, Ia.	19
Ames, Neb.	19
Ammendale, Md.	52
Amsterdam, N. Y.	36, 38
Anacosta, Mont.	20
Andalusia, Pa.	22
Anderson's Ranch, Nev.	19
Andover, Conn.	20
Andover, N. Y.	20, 39
Angola, N. Y.	39
Annadale, N. Y.	49
Annisquam, Mass.	31
Antares, Ariz.	23
Antietam Battlefields, Pa.	52
Antietam Station, Pa.	52
Antler's Station, Pa.	51
Antwerp, N. Y.	36
Apalachia, N. Y.	36, 38
Applegate, Cal.	19
Appanaug, R. I.	28
Arcadia, Fla.	24
Arcola, N. Y.	38
Archer, Wyo.	19
Ardmore, Pa.	18, 49
Arion, Ia.	19
Arkville, N. Y.	20, 38
Arlington, Vt.	29
Armstrong, P. Q.	32
Arno, Cal.	19
Arribo, Cal.	21
Arrow Rock, Mo.	23
Asbury Park, N. J.	49
Ascutneyville, Vt.	29
Ash Fork, Ariz.	23
Ash Hill, Cal.	23
Ashland, N. H.	29
Ashland, O.	19
Ashland, Va.	51
Ashmont, Mass.	31
Ashokan, N. Y.	38
Ashville, Me.	32
Ashville Plains, Pa.	51
Ashton, Ill.	19
Athens, Me.	31
Athens, Pa.	52
Athol, Mass.	32
Athol Springs, N. Y.	39
Atlanta, Ga.	24
Atlantic City, N. J.	49
Atlantic Coast, Map	25
Atlantic Highway, Map	40, 41
Atlatco, N. M.	23
Auburn, Cal.	19, 21
Auburn, Me.	31
Auburn, N. Y.	34, 36, 38
Audubon, Pa.	52
Augusta, Me.	31, 32
Aurora, Ill.	19
Assable Chasm, N. Y.	34, 39
Assable Forks, N. Y.	39
Austin, Nev.	19
Austin Summit, Nev.	19
Avalon, Pa.	19
Avoca, N. Y.	38
Avon, Mass.	31
Avon, N. J.	49
Avon, Pa.	52
Ayer, Mass.	32

B

Baca, N. M.	23
Badeb, Pa.	19
Bagdad, Cal.	23
Bainbridge, Ind.	21
Bainbridge, N. Y.	20, 38
Baker, Mont.	20
Baldwin P. O., N. Y.	36
Baldwinsville, Mass.	32
Ballston Lake, N. Y.	39
Ballston Spa, N. Y.	34, 39
Baltimore, Md., Map	50

	Page
Baltimore, Md.	22, 52
Bangor, Me.	26, 31, 32
Bankhead Highway, Map	40, 41
Banta, Cal.	19
Bantam, Conn.	20
Bar Harbor, Me.	26, 31
Barnegat, N. J.	40
Barnstable, Mass.	31
Barren Hill, Pa.	52
Barstow, Co.	23
Bartlett, N. H.	31
Barton, N. Y.	36, 38
Bartonsville, Pa.	51
Bartow, Fla.	24
Baskerville Station, Va.	51
Batavia, Ill.	19
Bath, Col.	21
Bath, N. H.	20
Bath, N. Y.	38, 39
Battle Mountain, Nev.	21
Bay City, Mich.	24
Bay View, N. Y.	30
Baysville, N. J.	40
Beach Grove, Tenn.	24
Beallville, Pa.	51
Bear Creek, Pa.	51
Beardstown, Ill.	21
Bearmont, Mont.	20
Beattie, Kan.	21
Beauce Junction, P. Q.	32
Beaueville, P. Q.	32
Beaumont, Pa.	52
Beaver, Pa.	19
Beaver Brook, Mass.	31
Bedford, Ind.	24
Bedford, Pa.	18, 51, 52
Beekmantown, N. Y.	39
Belair, Md.	22, 52
Beldon, N. Y.	20, 38
Belfast, Me.	31
Belfast, Pa.	51
Bellegrove, Md.	23
Bellemont, Ariz.	23
Belle Plaine, Ia.	18
Belleville, Ind.	23
Belleville, Kan.	21
Belleville, Pa.	21
Bellevue, O.	20
Bellevue, Pa.	19
Bellows Falls, Vt.	29
Belmont, N. J.	49
Belmont, N. Y.	39
Belkville, Md.	22, 52
Belvidere, N. Y.	39
Bemis, N. H.	31
Bemus Point, N. Y.	39
Benevola, Md.	22
Bennington, Vt.	29
Benton, Ind.	19
Benton Center, N. Y.	36
Berea, Ky.	24
Berkeley Heights, N. J.	49
Berkshire Mountains	34
Berlin, Conn.	28
Berlin, Ill.	21
Bernal, N. M.	23
Bernardston, Mass.	29
Berne, N. Y.	39
Berryville, Va.	52
Berwyn, Pa.	18, 49
Bethel, Conn.	24
Bethesda, Md.	22
Bethlehem, N. H.	29
Bethlehem, Pa.	21, 51
Beverly, Mass.	31
Beverly Farms, Mass.	31
Biddeford, Me.	31
Big Flats, N. Y.	38
Big Springs, Neb.	19
Bill Cove, Me.	32
Billings, Mont.	20
Bingham, Me.	20
Binghamton, N. Y.	20, 34, 36, 38, 52
Black Gap, Pa.	52
Blackstown, Pa.	51
Bladensburg, Md.	22, 52
Blaine, Me.	31
Blakeslee, Pa.	51

	Page		Page		Page
Franklin, N. H.	20	Groton, Conn.	28	Kingsley, Kan.	23
Franklin, O.	21	Grove City, Pa.	51	Kingsston, Mass.	31
Franklin, Pa.	20	Guam, N. M.	23	Kingsston, N. J.	18, 49
Franklin Grove, Ill.	19	Gypsum, Col.	21	Kingsston, N. Y.	20, 34, 38
Franklin Park, N. Y.	18, 49			Kingsville, Tenn.	24
Franklinton, N. C.	51	H		Kingsville, Md.	22, 52
Franktown, Nev.	19	Hackensack, N. J.	52	Kintersville, Pa.	52
Frederick, Md.	51	Hagerstown, Md., Map	51	Kirkville, O.	22
Fredericksburg, Va.	51	Hagerstown, Md.	22	Kirkwood, Ky.	52
Frederickton, N. B.	32	Hagerstown, Pa.	52	Kittery, Me.	31
Fredonia, N. Y.	30	Halstead, Kan.	23	Knightstown, Ind.	23, 24
Freedom, Pa.	10	Hamilton, Mo.	21	Knoxville, Tenn.	24
Freehold, N. Y.	49	Hamilton, Nev.	19	Kunkle, Pa.	52
Freeport, Me.	31	Hammond, Ill.	20, 21	Kutztown, Pa.	21
Fremont, Neb.	19	Hancock, Me.	32		
French, Col.	23	Hancock, Md.	51	L	
French Camp, Cal.	19	Hannibal, Mo.	21	Lacey Springs, Va.	52
Freneau, N. Y.	49	Hanover, N. H.	20	Laconia, N. H.	29
Friendship, N. Y.	39	Harmony, Ind.	23	Lafayette, O.	22
Frostburg, Md.	22	Harrington, Md.	32	La Grange, N. Y.	52
Frostburg, Pa.	51	Harrisburg, Pa., Map	50	La Junta, Col.	23
Fruitland, N. Y.	30, 39	Harrisburg, Pa.	21, 52	Lake City, Fla.	24
Fryeburg, Me.	31	Hartford, Conn., Map	33	Lake George, N. Y.	29, 36, 39
Fulton, Ill.	19	Hartford, Conn.	20, 28, 29	Lake Mahopac, N. Y.	36
Fulton, Mo.	23	Harve de Grace, Md.	52	Lake Placid, N. Y.	36
Fulton, N. Y.	30	Hayward, Cal.	19	Lakeside Park, Nev.	19
		Hebron, O.	22	Lakeville, N. Y.	29
G		Herkimer, N. Y.	36, 38	Lakewood, N. J.	49
Gainesville, Fla.	24	Highland Park, N. P.	18	Lake Wynota, N. Y.	52
Galtersburg, Md.	22, 51	Hillsboro, Tenn.	24	Lancaster, Pa.	18, 49
Gallion, O.	19	Holbrook, Ariz.	23	Lane, Nev.	19
Gallup, N. M.	23	Homer, Cal.	23	La Porte, Ind.	19
Gallupville, N. Y.	30	Hornell, N. Y.	20, 30	Laramie, Wyo.	19
Galt, Cal.	19	Houlton, Me.	31	LaSalle, O.	24
Gap, Pa.	18, 49	Hudson, N. Y.	36, 38	Las Animas, Col.	23
Garbutt, N. Y.	38	Humboldt, Nev.	21	Las Vegas, N. M.	23
Garden City, Kan.	23	Hummelstown, Pa.	52	Laughlontown, Pa.	18, 51
Gardner, Mass.	32	Huntington, Conn.	28	Laurel, Md.	22, 52
Garfield, Utah	19	Hutchinson, Kan.	23	Laverne, Tenn.	24
Garland, N. Y.	30	Hyannis, Mass.	31	Ledville, Col.	21
Garrison, Mont.	20	Hyattstown, Md.	22	Lebanon, Pa.	21, 52
Garrisonville, Va.	51	Hyde Park, N. Y.	20, 36, 38	Leesburg, Fla.	24
General Map	40, 41			Leesburg, Pa.	51
Geneva, Ill.	19	I		Leicester, Mass.	23
Geneva, N. Y.	38	Illon, N. Y.	36, 38	Lemon, Cal.	23
Genoa, Col.	38	Independence, Mo.	23	Lenox, Mass.	29, 36
George, Lake	21	Indianapolis, Ind.	21, 23, 24	Lepreux, N. B.	32
Georgetown, Ky.	34, 36	Indian Ranch, Utah	19	Levis, P. Q.	32
Georgia, Vt.	32	Indian Spring, Md.	51	Lewis, N. C.	51
Germantown, O.	21	Ingalls, Kan.	23	Lewiston, Me.	31
German Valley, N. Y.	21, 52	International Line, Me.	32	Lewiston, Pa.	21, 52
Gettysburg, Pa., Map	50	Intervale, N. H.	31	Lexington, Ky.	24
Gettysburg, Pa.	49, 51, 52	Ipswich, Mass.	31	Lexington, Mass.	32
Gifford, N. Y.	40	Ipswich, S. D.	20	Lexington, Mo.	23
Gifford, Conn.	28	Iroquois Trail, Map	34	Lexington, Neb.	19
Gillespie, Pa.	51	Iroquois Trail	39	Ligonier, Ind.	19
Gilpen, Md.	32, 51	Irvington, N. J.	49, 52	Ligonier, Pa.	18, 51
Glacier National Park, Map	20	Irvington, N. Y.	36, 38	Lima, O.	19, 24
Gladstone, Ia.	19	Iselin, N. J.	18, 22, 49	Limon, Col.	21
Glassboro, N. J.	49	Ithaca, N. Y., Map	35	Lincoln Highway, Map	18, 40, 41
Glenbrook, Nev.	19	Ithaca, N. Y.	39	Lincoln Highway	18, 49
Glenburn, Pa.	52			Liabon, Ia.	19
Glen, N. H.	31	J		Liabon, O.	19
Glen Falls, N. Y.	29, 36	Jackson Highway, Map	40, 41	Littleton, N. H.	29
Glenfield, Pa.	19	Jacksonville, Fla.	24	Live Oak, Fla.	24
Glenwood Spring, Col.	21	Jacksonville, Ill.	21	Livermore, Cal.	21
Glidden, Ia.	19	Jacksonville, Pa.	19, 51	Livermore Falls, Me.	31
Glorieta, N. M.	23	Jamestown, N. Y.	34, 39	Livingston, Mont.	20
Golconda, Nev.	21	Jasper, Tenn.	24	Lodi, Cal.	21
Gold Run, Cal.	19	Jefferson, Ia.	19	Logan, Ia.	19
Gonsales, N. M.	23	Jefferson, O.	19	Logansport, Ind.	24
Goodland, Kan.	21	Jefferson Highway, Map	40, 41	London, Ky.	24
Gothen, Ind.	19	Jeffersonville, Pa.	52	Long Branch, N. J.	49
Gothenburg, Neb.	19	Jennings, Kan.	21	Long Island, N. Y., Map	37
Granada, Kan.	23	Jersey City, N. J.	18, 22, 34, 38, 49, 52	Lookout, Wyo.	19
Grand Gorge, N. Y.	38	Joliet, Ill.	19	Loomis, Cal.	19
Grand Haven, Mich.	24	Johnsburg, Mo.	23	Lorton, Va.	51
Grand Island, Neb.	19	Johnsville, O.	22	Los Angeles, Cal.	23
Grand Junction, Ia.	19			Louisville, Ky.	24
Grand Mount, Ia.	19	K		Loveland, Ia.	19
Grand Rapids, Mich.	24	Kalamazoo, Mich.	24	Lovelock, Nev.	21
Granger Junction, Wyo.	19	Kansas City, Mo.	23	Lowden, Ia.	19
Granite, Col.	21	Kearney, Neb.	19	Lowell, Mass.	29
Granite Falls, Minn.	20	Keene, N. Y.	36, 39	Ludlow, Cal.	23
Graniteville, Md.	22	Keeseville, N. Y.	39	Luzerne, N. Y.	39
Grantsville, Utah	19	Kellogg, Ida.	20	Luzerne, Pa.	52
Granville, Wyo.	19	Kendall, Kan.	23	Lyman, Wyo.	19
Grapeville, Pa.	18, 51	Kennebunk, Me.	31	Lyme, Conn.	28
Great Bend, Kan.	23	Kenosha, Wis.	20	Lyme, Mass.	28, 31
Great Bend, Pa.	52	Kensington, Kan.	21	Lyons, Kan.	23
Greenfield, Ind.	21, 23	Kensington, O.	21		
Greenfield, Mass.	29, 32	Keyport, N. J.	49	M	
Greenfield, N. Y.	39	Kimball, Neb.	19	Machias, Me.	32
Green River, Wyo.	19	Kimmell, Ind.	19	Mackinaw, Mich.	24
Greensburg, Pa.	18, 51	Kingman, Ariz.	23	Macon, Ga.	24
Greenville, Ill.	23	King of Trails Highway, Map	40, 41	Macon City, Mo.	31
Greenville, Me.	31			Madison, Ga.	24
Greenwich, Conn.	28			Magnolia, Mass.	31
Grima, Ga.	24			Maine Map	27
				Main Forks, Utah	19

1

8

P

Q

R

Digitized by Google

	Page		Page		Page
Snell, Va.	51	Tannersville, Pa.	51	Walpole, Mass.	28
Snowville, Utah	21	Tarrytown, N. Y.	29, 36, 38, 52	Waltham, Mass.	31
Snyder, N. Y.	38	Taunton, Mass.	20, 31	Wampsville, N. Y.	36, 38
Sodus, N. Y.	36, 39	Tawasa City, Mich.	24	Wamsutter, Wyo.	19
Somerfield, Pa.	51	Terra Haute, Ind.	23	Wapinger Falls, N. Y.	30, 38
Somerfield, W. Va.	22	Terry, Mont.	20	Wareham, Mass.	31, 32
Somerset, Mass.	31	Tewksbury, Mass.	29	Warren, Pa.	20
Somerworth, N. H.	31	Thatcher, Col.	23	Warren, R. I.	31
Somerville, Mass.	31	Theresa, N. Y.	36, 39	Warrenton, Mo.	23
Somerville, N. Y.	36	Thistle, Utah	21	Warrington, Pa.	52
Sonora, N. Y.	39	Thomaston, Me.	31	Warsaw, Ind.	20
Soudersburg, Pa.	18, 49	Thomasville, Ga.	24	Warsaw, N. Y.	38
South Bend, Ind.	19, 24	Thomasville, Pa.	49	Wasatch, Utah	19
Southbury, Conn.	28	Thoreau, N. M.	23	Washington, D. C., Map	51
South Egremont, Mass.	29, 36	Thorndale, Pa.	18, 49	Washington, D. C.	22, 51
Southern National Highway, Map	40, 41	Thorp, Wash.	20	Washington, Kan.	31
Southfields, N. Y.	36, 38	Three Forks, Mont.	2	Washington, N. J.	21, 49
South Hill, Va.	51	Ticonderoga, N. Y.	32, 39	Washington, O.	22
Southington, Conn.	20	Tilghmantown, Pa.	52	Washington, Pa.	51
South Norridgewock, Me.	32	Timpan, Col.	23	Washington, W. Va.	22
South Park, Wash.	20	Tioga Center, N. Y.	36, 38	Washoe, Nev.	19
Southport, Conn.	28	Tippet, Nev.	19	Wassale, N. Y.	29, 36
Spanish Forks, Utah	21	Titusville, Fla.	24	Waterbury, Conn.	28
Spanish Trall, Old, Map	40, 41	Tiverton, R. I.	31	Waterford, N. Y.	36
Sparks, Nev.	19	Tobyhanna, Pa.	51	Waterloo, Neb.	19
Spearville, Kan.	23	Toledo, O.	24	Waterloo, N. Y.	36, 38
Spencer, Mass.	28	Tom's Brook, Va.	52	Waterloo, Pa.	52
Spokane, Wash.	20	Tottenville, N. Y.	49	Watertown, Mass.	31
Spottsylvania, Va.	51	Towanda, N. Y.	52	Watertown, N. Y.	36, 39
Springer, N. M.	23	Tracy City, Tenn.	24	Waterville, Me.	31, 32
Springfield, Ill.	21	Transcontinental Routes, Map	40, 41	Watkins Glen, N. Y.	34, 36
Springfield, Mass., Map	33	Transcontinental Routes	18	Waukegan, Ill.	24
Springfield, Mass.	28	Traverse City, Mich.	24	Waverly, Kan.	23
Springfield, N. J.	49, 52	Trenton, Fla.	24	Waverly, Mo.	23
Springfield, O.	21, 23	Trenton, N. J.	18, 22, 49	Waverly, N. Y.	20, 36, 38, 52
Springfield Hill, N. B.	32	Tribes Hill, N. Y.	36, 38	Waycross, Ga.	24
Spring Lake, N. J.	49	Trinidad, Col.	23	Wayne, Pa.	18, 49
Spring Valley, N. Y.	36	Troy, Mo.	21	Waynesboro, Pa.	52
Staatsburg, N. Y.	36, 38	Troy, N. Y., Map	36	Webster, Md.	22
Stafford, N. Y.	38	Troy, N. Y.	32	Webster, S. D.	20
Stafford, Pa.	49	Troy, O.	24	Weehawken, N. J.	18, 49, 52
Stamford, Conn.	28	Truckee, Cal.	19, 21	Wellfleet, Mass.	31
Stamford, N. Y.	38	Truro, Mass.	31	Wellington, Mo.	23
Stanley, N. Y.	36	Truxton, Ariz.	23	Wells, Nev.	21
Stanly, Wis.	20	Tuckerton, N. J.	49	Westerly, R. I.	28
Stanwood, Ia.	19	Tunkhannock, N. Y.	52	Westgate, Nev.	19
Stapleton, N. Y.	49	Turner's Falls, Mass.	32	Weston, Mass.	28
State Center, Ia.	19	Tuscola, Ill.	21	West Palm Beach, Fla.	24
Staunton, Va.	52	Tuxedo, N. Y.	36, 38	Westport, Conn.	28
Steamboat Springs, Nev.	19	Twin Mountain House, N. H.	29, 31	Westport, N. Y.	39
Stepney, Conn.	28			Westville, Ind.	19
Sterling, Ill.	19	U		Westwood, N. J.	52
Sterling, Kan.	23	Uhrichsville, O.	21	Wheatland, Ia.	19
Sterling, Mass.	31	Ulster, N. Y.	52	Wheeling, W. Va.	22, 51
Sterling, O.	22	Unadilla, N. Y.	20, 38	White Mountains, N. H.	29, 31
Steubenville, O.	21	Union, N. Y.	36, 38	White Plains, N. Y.	28, 52
Stevens Point, Wis.	20	Union Hill, N. J.	36, 49	White River Junction, Vt.	29
Stilesville, Ind.	23	Uniontown, Pa.	51	Whitford, Pa.	49
Stillwater, Nev.	19	Uniontown, W. Va.	22	Wier, N. H.	29
Stockbridge, Mass.	29, 36	Upland, Cal.	23	Wilkes-Barre, Pa., Map	51
Stockport, N. Y.	36, 38	Upper Jay, N. Y.	36, 39	Wilkes-Barre, Pa.	51, 52
Stockton, Cal.	19, 21	Upper Red Hook, N. Y.	36, 38	Wilkinsburg, Pa.	19, 21
Stockton, Me.	31	Utica, N. Y., Map	37	Williamsburg, Kan.	28
Stoddardsville, Pa.	51	Utica, N. Y.	34, 36, 38	Williamantic, Conn.	20
Stone Church, Pa.	52			Wilmington, Del.	22, 52
Stone Mountain, Ga.	24	V		Wiscasset, Me.	31
Stonington, Conn.	28	Vail, Ia.	19	Wolcott, Col.	21
Stony Brook, Pa.	49	Valatie, N. Y.	36, 38	Wolcott, N. Y.	36, 39
Stormville, N. Y.	20	Valentine, Ariz.	23	Wolf Lake, Ind.	19
Stoughton, Mass.	31	Valley, Neb.	19	Wolfsburg, Pa.	18, 51
Stovall, N. C.	51	Valparaiso, Ind.	19, 20	Woodbine, Ia.	19
Stow, Mass.	31	Vandalla, Ill.	23	Woodbridge, Cal.	19
Stoyestown, Pa.	18, 51	Vandalla, N. Y.	39	Woodbridge, N. J.	52
Strassburg, Va.	52	Van Wert, O.	19	Woodlawn, N. Y.	39
Stratford, Conn.	28	Varysburg, N. Y.	38	Woodstock, N. Y.	29
Stratton, Col.	21	Vaux Hall, N. J.	52	Woodstock, Vt.	29
Stratton, Me.	31	Verdi, Nev.	19	Woodstock, Va.	52
Strawberry, Cal.	19	Vermont, Map	27	Wooster, O.	19
Stroudsburg, Pa.	21, 51	Vermont, Cal.	23	Worcester, Mass., Map	33
Stuyvesant Falls, N. Y.	36, 38	Vernal, Utah	21	Worcester, Mass.	28
Sudbury, Wash.	20	Vernango, Pa.	51	Wrightsville, Pa.	49
Suffern, N. Y.	36, 38	Vernon, N. Y.	36, 38	Wyandotte, Mich.	21
Sullivan, Me.	32	Verona, Va.	52		
Summersford, O.	22	Vestal, N. Y.	36, 38	Y	
Summersville, Ga.	24	Victorville, Cal.	23	Yakima, Wash.	20
Summit, N. J.	49	Vienna, N. J.	52	Yampai, Ariz.	23
Summit, Pa.	21, 51	Vienna, O.	22	Yarmouth, Mass.	21
Summit, W. Va.	22	Vinceland, N. J.	49	Yellowstone National Park, Map	20
Suncook, N. H.	29	Vintage, Pa.	49	Yellowstone Trail, Map	40, 41
Sunol, Neb.	19			Yellowstone Trail	18, 20
Sutherland, Neb.	19	W		Yonkers, N. Y.	29, 36, 38
Swampscott, Mass.	31	Wacoma, Minn.	20	York, Me.	31
Swiftwater, Pa.	51	Wadsworth, Nev.	19, 21	York, Pa.	18, 49
Sylvan Park, Me.	32	Wakefield, R. I.	28	York's Mills, N. B.	52
Syracuse, Kan.	23	Wake Forest, N. C.	51	Yorktown Heights, N. Y.	28, 36
Syracuse, N. Y., Map	37	Walcott, Wyo.	19	Youngstown, O.	20
Syracuse, N. Y.	34, 36, 38, 39	Waldoboro, Me.	31	Youngstown, Pa.	18, 51
		Wallace, Ida.	20		
		Walla Walla, Wash.	20	Z	
		Wallingford, Conn.	28	Zanesville, O.	22
		Wallington, N. Y.	36, 39	Zellanople, Pa.	51
		Wallula, Wash.	20		
T					
Tacoma, Wash.	20				
Tallahassee, Fla.	24				
Tama, Ia.	19				

Pennsylvania Routes



NEW YORK-PHILADELPHIA.

New York-Atlantic City.

Miles	Miles
New York..... 0.0	Avon..... 66.7
Newark..... 8.9	Belmont..... 67.4
Elizabeth..... 15.1	Spring Lake..... 69.0
Rahway..... 20.7	Searight..... 70.7
Perth Amboy..... 28.2	Mansquan..... 71.7
South Amboy..... 32.3	Brielle..... 72.7
Keyport..... 38.3	Pt. Pleasant..... 74.3
Middletown..... 44.4	Burrville..... 78.7
Red Bank..... 49.3	Lakewood..... 84.0
Shrewsbury..... 51.2	Toms River..... 94.0
Eatontown..... 52.8	Bayville..... 98.4
Long Branch..... 57.4	Barnegat..... 110.4
West End..... 59.0	Manahawken..... 115.2
Elberon..... 60.7	Tuckerton..... 122.9
Deal..... 62.1	New Gretna..... 129.6
Allenhurst..... 63.1	Port Republic..... 136.3
Asbury Park..... 64.3	Oceanville..... 140.7
Ocean Grove..... 65.2	Absecon..... 144.2
Bradley Beach..... 65.7	Atlantic City..... 153.5

Atlantic City-Cape May.

Miles	Miles
Atlantic City..... 0.0	Ocean View..... 26.8
Pleasantville..... 5.3	Cape May C. H..... 35.6
Ocean City..... 14.9	Rio Grande..... 41.5
Seaville..... 24.6	Cape May..... 48.1

Cape May-Philadelphia.

Miles	Miles
Cape May..... 0.0	Franklinville..... 62.4
Cape May C. H..... 13.1	Clayton..... 65.0
Dennisville..... 22.0	Glassboro..... 67.7
Eldora..... 27.0	Hurtville..... 72.3
Leesburg..... 33.2	Westville..... 80.0
Mauricetown..... 37.3	Gloucester..... 80.9

Millville..... 46.8	Camden..... 85.5
Vineland..... 53.3	Philadelphia..... 85.5

OPTIONAL.

New York City-Atlantic City, N. J.

Miles	Miles
New York City..... 0.0	Adelphia..... 41.2
St. George..... 0.3	Lakewood..... 50.4
Tompkinsville..... 0.6	Tom's River..... 60.1
Stapleton..... 1.3	Bayville..... 64.4
New Dorp..... 6.0	Lanoka..... 67.2
Gifford..... 8.6	Forked River..... 69.4
Annadale..... 10.6	Waretown..... 73.0
Huguenot..... 11.3	Barnegat..... 76.2
Princes Bay..... 11.9	Manahawkin..... 80.5
Pleasant P'ns..... 12.7	Cedar Run..... 81.5
Tottenville..... 14.8	Mayetta..... 82.1
P. Amboy, N. J..... 15.5	West Creek..... 85.5
South Amboy..... 18.7	Parkertown..... 86.2
Morgan..... 21.3	Tuckerton..... 88.4
Keyport..... 24.7	New Gretna..... 94.5
Matawan..... 26.6	Port Republic..... 101.0
Freneau..... 27.9	Smithville..... 103.6
Morganville..... 29.5	Oceanville..... 105.4
Wickatunk..... 31.3	Absecon..... 109.3
Marlboro..... 33.8	Pleasantville..... 111.8
Freehold..... 37.8	Atlantic City..... 118.3

New York City-Easton, Pa.

Miles	Miles
New York City..... 0.0	Far Hills..... 39.5
(Ferry to Weehawken, N. J.)	Pedminster..... 40.3
Union Hill..... 0.8	Lamington..... 44.6
Jersey City..... 5.1	White House..... 48.6
Newark..... 11.6	Annadale..... 50.0
Irvington..... 15.1	Clinton..... 57.7
Springfield..... 19.4	Glen Gardner..... 62.4
	Hampton..... 63.4

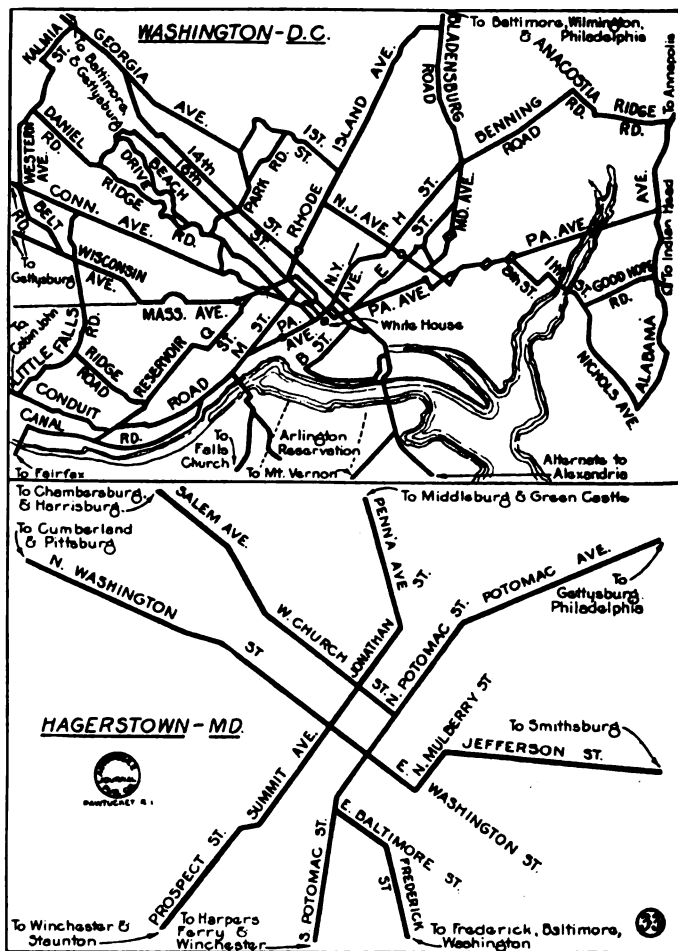
Summit..... 22.5	Washington..... 68.1
West Summit..... 24.2	Broadway..... 72.1
New Providence..... 25.3	New Village..... 74.2
Berk's Heights..... 27.7	Phillipsburg..... 80.6
W. Millington..... 33.2	Easton..... 81.1
Liberty Corner..... 35.6	

New York City-Philadelphia. (Via Lincoln Highway.)

Miles	Miles
New York City..... 0.0	Franklin Park..... 41.7
(Ferry to Weehawken, N. J.)	Kingston..... 48.4
Jersey City..... 5.2	Princeton..... 51.3
Newark..... 11.8	Lawrenceville..... 56.5
Elizabeth..... 17.3	Trenton..... 62.7
Roselle..... 20.0	Oxford Val., Pa..... 69.4
Rahway..... 23.7	Langhorne..... 72.2
Iselin..... 27.2	Bustleton..... 80.9
Metuchen..... 29.7	Oxford Circle..... 83.4
New Brunswick..... 35.2	Philadelphia..... 92.1

Philadelphia-Gettysburg, Pa.

Miles	Miles
Philadelphia..... 0.0	Vintage..... 53.1
Ardmore..... 9.2	Williamstown..... 54.6
Bryn Mawr..... 11.0	Paradise..... 55.6
Wayne..... 15.0	Soudersburg..... 57.3
Stafford..... 15.6	Lancaster..... 65.5
Berwyn..... 18.0	Mountville..... 72.1
Paoli..... 20.4	Columbia..... 76.2
Exton..... 27.8	Wrightsville..... 77.7
Whitford..... 29.2	Hallam..... 82.1
E. Downingtown..... 32.5	Stony Brook..... 84.6
Downingtown..... 33.1	York..... 89.4
Thorndale..... 35.4	Thomasville..... 96.5
Coatesville..... 39.3	Farmers..... 99.8
Sadsburyville..... 43.0	Abbotstown..... 104.3
Gap..... 50.1	New Oxford..... 108.4
Kinners..... 52.3	Gettysburg..... 118.2



	Miles		Miles
WilkesBarre...	0 0	Nazareth.....	65.1
Ashville Plains..	5.2	Bethlehem.....	74.7
Fairview.....	6.7	Coopersburg....	83.0
Bear Creek.....	16.7	Quakertown....	89.1
Stoddardsville..	25.0	Sellersville....	89.6

	Miles
Washington . . .	0.0
S. Strabane . . .	5.1
Glyre . . .	6.7
Odell . . .	9.0
Hillsboro . . .	12.0
Beallsville . . .	15.0
Centerville . . .	17.8
Malden . . .	20.7
W. Brownsville . .	23.1
Brownsville . . .	23.5

	Miles
Hopwood.....	36.8
Mt. Washington.....	46.5
Farmington.....	47.9
Thomas.....	58.0
Somerfield.....	58.4
Addison.....	61.8
Keyser's R., Md.....	68.1
Grantsville.....	73.7
Frostburg.....	88.0
Eckhart.....	89.3

Miles	Miles
Richmond..... 0.0	Clarksville..... 110.7
Manchester..... 2.0	Soudan..... 116.2
Petersburg..... 22.4	Bullock, N. C..... 122.0
Dinwiddie..... 37.8	Stovall..... 125.3
Butterw'ith Sta. 40.7	Lewis..... 130.5
Dewitt Station. 42.3	Oxford..... 135.0
Cochran..... 64.5	Franklinton..... 156.5
South Hill..... 80.4	Youngville..... 164.1
Baskerville Sta. 91.0	Wake Forest..... 168.3
Antler's Station 94.8	Raleigh..... 184.6
Boydton..... 99.7	

New York City-Delaware Water Gap, Pa.

Miles		Miles
New York City 0.0	Chester 44.6	
(Ferry to Weehawken, N. J.)	German Valley 49.1	
North Bergen 1.4	Schooley's M't'n 51.7	
Jersey City 5.2	Hackettstown 55.8	
Newark 11.8	Vienna 59.8	
Irrington 15.8	Great Meadows 61.0	
Vaux Hall 18.4	Buttsville 68.4	
Springfield 20.2	Bridgeville 70.4	
Chatham 24.8	Delaware 74.3	
Madison 27.0	Portland, Pa. 77.5	
Morristown 31.7	Slateford 79.3	
Mendham 38.7	Del. Water Gap 82.9	

Binghamton, N. Y.-Scranton, Pa.

Miles		Miles
Binghamton 0.0	Nicholson 43.0	
Langdon 6.7	Factoryville 48.1	
Kirkwood 8.8	La Plume 49.0	
Great Bend, Pa. 14.3	Dalton 51.8	
Hallstead 14.9	Glenburn 53.0	
New Milford 20.9	Clark's Summit 55.2	
Heart Lake 25.5	Chinchilla 57.2	
Brooklyn 33.3	Scranton 62.0	
Foster 37.2		

Port Chester, N. Y.-Newark, N. J.

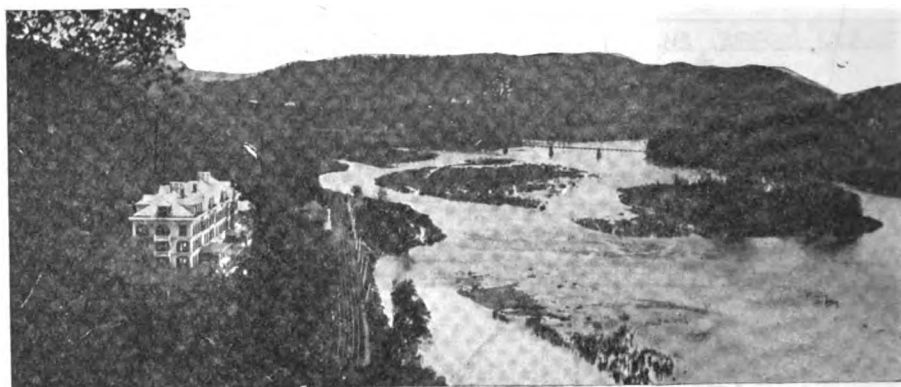
Miles		Miles
Port Chester 0.0	Hillsdale 26.5	
White Plains 6.3	Westwood 27.4	
Elmsford 9.7	Emerson 28.8	
Tarrytown 13.0	Oradelle 30.3	
Nyack 13.9	River Edge 31.3	
West Nyack 16.4	Hackensack 35.2	
Nauet 19.4	Woodbridge 39.5	
Pearl River 22.2	Carlstadt 40.2	
Montvale, N. J. 23.6	Rutherford 41.1	
Park Ridge 24.4	Lyndhurst 42.3	
Woodcliff Lake 25.2	Newark 49.3	

Elmira, N. Y.-Scranton, Pa.

Miles		Miles
Elmira 0.0	Sugar Run 57.2	
Lowman 6.7	Hollenbeck 60.6	
Chemung 12.8	Jenningsville 68.9	
Waverly 17.3	Mauch Chunk 75.2	
Snyre, Pa. 20.1	Eatonville 83.8	
Athens 22.0	Tunkhannock 85.9	
Green's Land'g. 24.2	La Grange 91.1	
Millan 25.9	Lake Wynola 93.5	
Uster 30.3	Mill City 95.9	
North Towanda 37.0	Shultsville 100.9	
Towanda 38.6	Clarke Summit 104.7	
Wysox 41.4	Chinchilla 106.9	
Durrell 45.8	Providence 110.0	
Terrytown 53.4	Scranton 112.7	

Elmira, N. Y.-WilkesBarre, Pa.

Miles		Miles
Elmira 0.0	Laceyville 63.6	



Delaware Water Gap, Looking Up River from Heights Above Kittatinny Hotel.

Wellsburg 6.9	Meshoppen 71.0	Charlestown 58.1	Hyattsville 137.4
Chemung 14.1	Russell Hill 74.7	Principio 61.6	Bladensburg 138.2
Waverly 18.6	Tunkhannock 80.0	Perryville 64.3	Wash'gton, D. C. 143.3
Athens, Pa. 22.2	Peterboro 88.5	Havre De Grace 65.2	
Uster 30.3	Bowman Creek 91.4		
Towanda 38.4	Beaumont 93.5		
Wysox 41.0	Kunkle 95.9		
Standing Stone 45.2	Dallas Station 99.1		
Rummerfield 48.1	Luzerne 105.5		
Wyalusing 55.2	WilkesBarre 108.6		

Port Jervis, N. Y.-Easton, Pa.

Miles		Miles
Port Jervis 0.0	Portland 44.9	
Milford, Pa. 7.0	Mt. Bethel 46.4	
Dingman's F'y 15.6	Stone Church 49.2	
Egypt Mills 24.0	Richmond 51.0	
Bushkill 27.4	Mt. Pleasant 53.8	
Shawnee 36.3	Martin's Creek 56.1	
N. Water Gap 38.3	Sandt's Eddy 58.9	
Del. Water Gap 39.5	Easton 63.8	
Slateford 43.1		

Philadelphia, Pa.-Washington, D. C.

Miles		Miles
Philadelphia 0.0	Aberdeen 70.5	
Darby 8.2	Churchville 76.9	
Norwood 11.1	Bel Air 82.3	
Chester 15.6	Kingsville 89.8	
Marcus Hook 19.6	Perry Hall 92.8	
Wilm'ton, Del. 28.4	Overlea 98.4	
Elsmere Junc'n 31.3	Baltimore 103.6	
Marshallton 34.1	Elkridge 114.1	
Newark Center 41.7	Laurel 125.1	
Newark 42.3	Mulrirk 128.8	
Elkton, Md. 48.9	Ammendale 129.9	
Northeast 55.1	Beltville 131.0	

Philadelphia-Easton, Pa.

Miles		Miles
Philadelphia 0.0	Piperville 34.8	
Ogonts 8.9	Ottaville 38.3	
Jenkintown 10.4	The Harrows 40.1	
Abington 11.5	Revere 41.9	
Willow Grove 13.8	Ferndale 43.4	
Warrington 21.8	Kintnersville 45.3	
Turk 24.5	Lehnenburg 46.9	
Doylestown 26.1	Riegelsville 48.5	
Danboro 29.3	Raubsville 52.0	
Plumsteadville 31.8	Easton 57.6	

Philadelphia-Phoenixville, Pa.

Miles		Miles
Philadelphia 0.0	Jeffersonville 19.1	
Fairmount Pk. 1.0	Audubon 22.4	
Wissahickon 5.9	Oaks 23.4	
Barren Hill 11.4	Port Providence 25.8	
Harmonville 13.4	Montelare 26.6	
Norristown 16.7	Phoenixville 27.1	

Philadelphia-Reading, Pa.

Miles		Miles
Philadelphia 0.0	Pottstown 39.3	
Barren Hill 13.7	Douglasville 43.8	
Fairview 22.9	Reading 56.4	
Collegeville 27.2		

Reading-Harrisburg, Pa.

Miles		Miles
Reading 0.0	Lebanon 28.3	
Robesonia 12.0	Palmyra 37.4	
Womelsdorf 14.5	Hershey 40.7	
Waterloo 17.2	Swatara 41.5	
Myerstown 21.3	Hummelstown 44.0	
Avon 26.1	Harrisburg 53.1	

Harrisburg-Gettysburg, Pa.

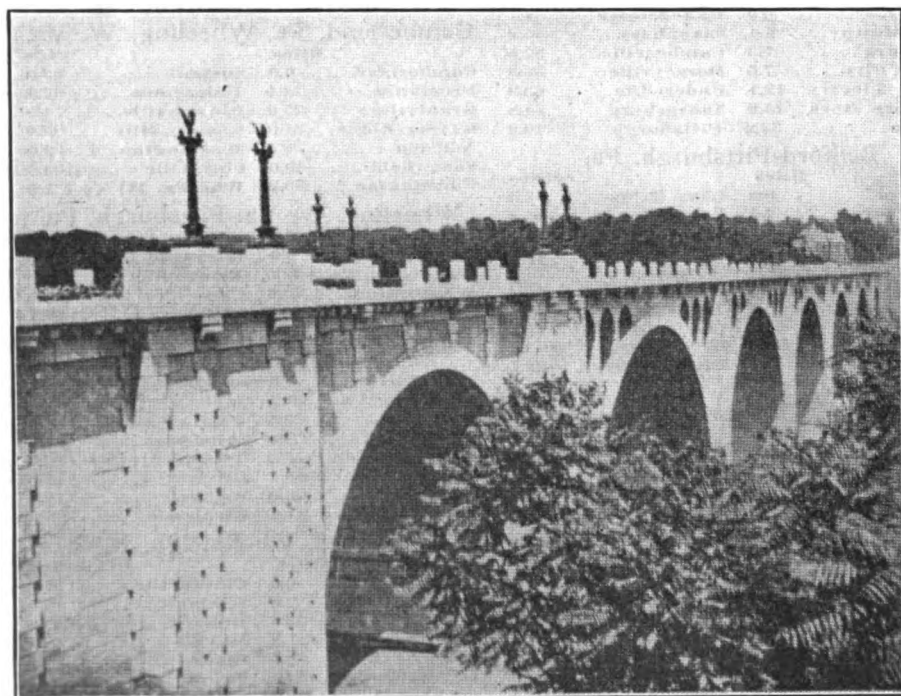
Miles		Miles
Harrisburg 0.0	Clear Spring 17.0	
Camp Hill 3.2	York Springs 23.3	
Shepardstown 9.3	Heidlersburg 27.5	
Dillsburg 14.6	Gettysburg 37.0	

Gettysburg-Bedford, Pa.

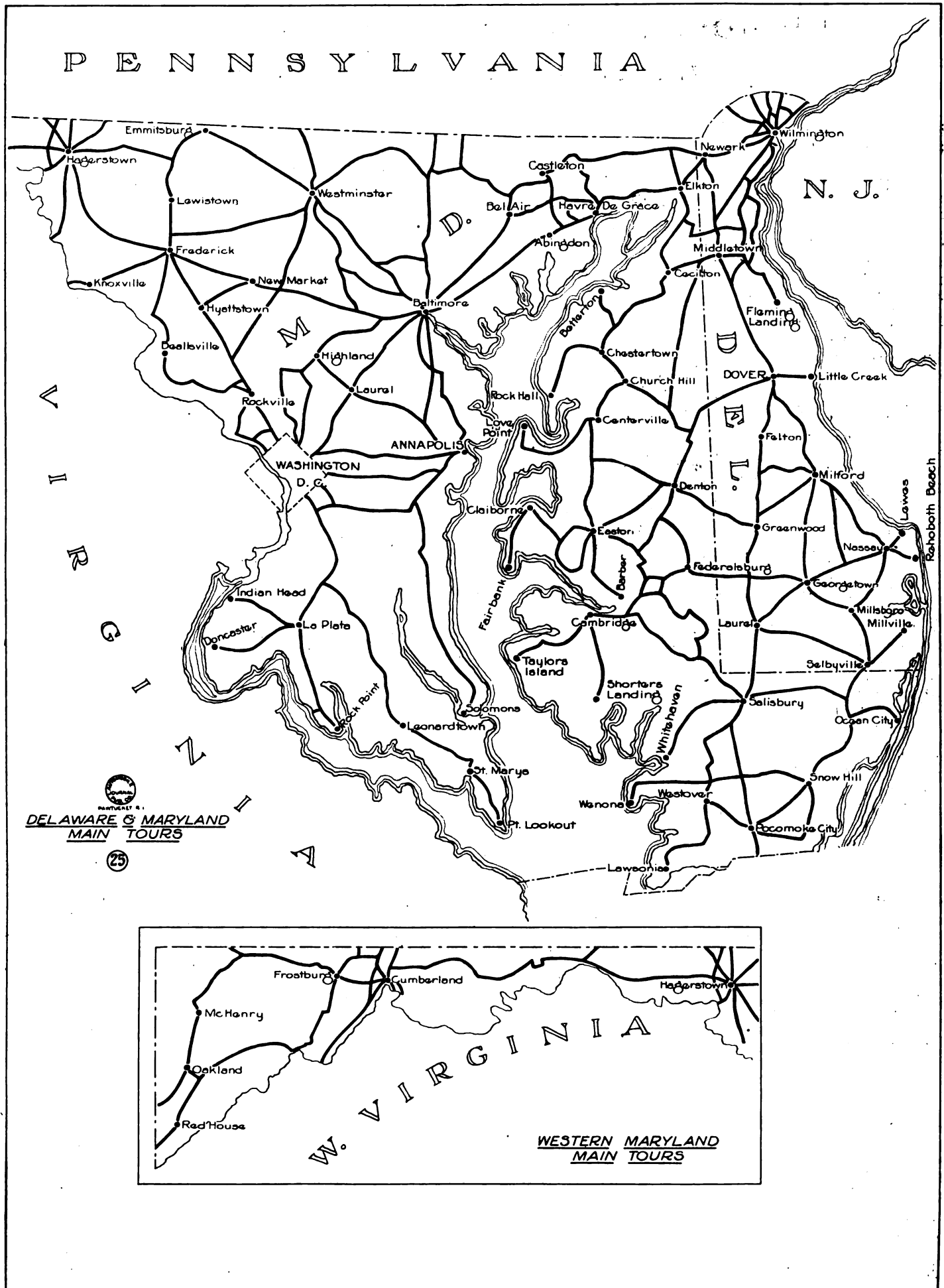
Miles		Miles
Gettysburg 0.0	Fort Loudon 38.0	
Seven Stars 3.8	McConnellsburg 45.9	
McKnightstown 5.8	Harrisville 52.3	
Cashtown 7.7	McIlvaine 62.7	
Black Gap 15.7	Breezewood 63.7	
Fayetteville 18.3	Everett 72.0	
W. Fayetteville 19.8	The Willows 76.7	
Chambersburg 24.5	Bedford 80.0	
St. Thomas 32.0		

Gettysburg, Pa.-Staunton, Va.

Miles		Miles
Gettysburg 0.0	Strassburg 105.3	
Fairfield 8.1	Tom's Brook 111.0	
Charman Sta'n 15.2	Maurertown 112.5	
Rouersville 18.5	Woodstock 116.6	
Waynesboro 21.6	Edinburg 121.8	
Leitersburg 27.0	Mt. Jackson 129.2	
Hagerstown 33.3	Newmarket 136.7	
Tilghmantown 41.5	Lacey Springs 145.5	
Antietam B'y'ds 45.8	Harrisburg 153.8	
Sharpsburg 47.3	Mt. Crawford 161.9	
Antietam Sta'n 48.7	Burkstown 164.7	
Shep'tn, W. Va. 50.9	Mt. Sydney 169.7	
Halltown Sta. 59.8	Willow Spout 171.7	
Charlestown 63.5	Verona 174.0	
Berryville, Va. 70.2	Staunton 180.9	
Winchester 86.9		



Bridge Over Rock Creek on Connecticut Avenue Route Out of Washington, Toward Rockville and Frederick.



Thorough Inspection of Car Needed Before Starting on Tour

BEFORE starting out on the vacation touring trip, the motorist should, above all other matters, give his car a thorough inspection, making all necessary adjustments and renewals for, even if this was done before the automobile was put into commission in the spring, certain minor adjustments will, by this time, inevitably be found necessary, if nothing more serious has developed, and it is well to take no chances on an extended trip. of being worried and delayed by the call for repairs and adjustments en route, to say nothing of the liability of accidents and, perhaps, serious damage to the car or injury to its occupants, through failure of some neglected part or accessory.

This inspection of the machine before starting on a trip of more than ordinary length should be done in a thoroughly systematic manner, each part being checked up carefully as its condition is noted and the necessary adjustments and renewals made. in order that no portion of the ensemble may be overlooked. This will include such work as cleaning of fuel supply pipes, strainers, etc., grinding valves, if the compression is unsatisfactory, testing and adjusting of brakes and other components, etc.

The Cooling System.

The first unit to receive attention would naturally be the cooling system as on this unit depends largely whether the engine works satisfactorily or not—whether it will overheat or operate at the temperature the manufacturer intended. The cooling system includes the radiator and its connections to the engine, the water pump, if used, the water jackets of the engine and the fan.

Troubles in the radiator may be classed under two headings, collection of rust and sediment, and leaks. The inside of the core will in time collect more or less rust due to the action of the water and the use of anti-freeze mixtures during the colder months. This rust and sediment should be removed at intervals to allow the cooling system to function properly. Cleaning with lye or sal soda dissolved in hot water is probably the simplest and best method, as it may be done in a short time without disassembling the unit. To mix the solution, take one-half pound of either lye or sal soda,

dissolve it in five gallons of hot water and after the radiator has been drained, fill with the solution, allowing the engine to run idle for about half an hour to keep the solution hot and cause it to circulate.

If the system is badly rusted, it may require two or three treatments before the rust and sediment are entirely removed. Drain out the solution through

tegrated particles may form lumps in the water passage which will restrict the flow of water to and from the radiator. The cleaning process, when removing rust and sediment, will naturally also cleanse the engine water jacket as well as the interior of the water pump so that these units will be taken care of at that time. The water pump should next be examined for leaks at the side bushings

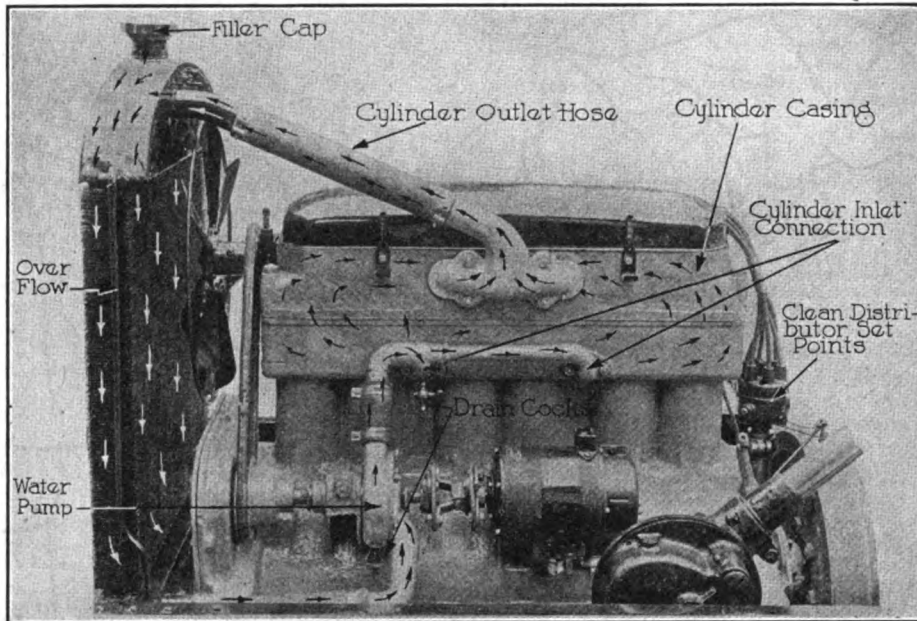
or the stuffing boxes of the pump shaft. These are filled with oiled wicking and should be tightened whenever a leak occurs. If the stuffing nuts are turned down as far as they will go, they should be turned off, the old wicking picked out and new, soaked in oil, supplied, and the stuffing box nuts tightened again to a point where water does not leak.

The fan and its belt, driven from the crankshaft pulley, are very important factors in the cooling system and should be examined closely. If the belt is loose, allowing the fan to run below the required speed, the engine is liable to

overheat during hard pulls. Belt should be adjusted so that it is just tight enough to drive the fan without putting undue strain upon the belt. Adjustment is made at the supporting arm of the fan, a suitable screw adjustment being provided for that purpose. Loosening the screw and lifting the arm and then tightening the screw again will provide correct adjustment. Note that the fan hub grease cup is filled and the bearings, both front and rear, well supplied with lubricant. Listen to the operation of the fan and if there is a grinding sound issuing from either of its bearings a ball is probably broken in the race which may cause trouble later. Disassemble the fan, and replace the damaged balls, filling the race with grease when assembling. Strained or damaged belts had better be removed and new members fitted, as a damaged belt is very likely to give future trouble.

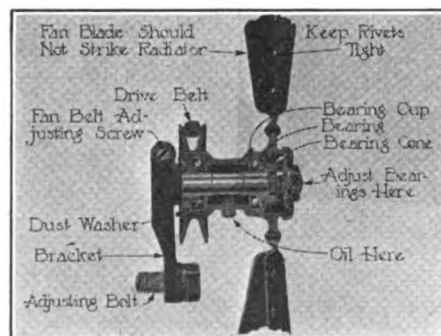
Care of the Engine.

The engine is the next unit to be examined. It is quite likely that the valves will need to be ground and the carbon cleaned off—two jobs that can be performed at the same time. If the engine is of the separable head type the carbon cleaning operation is simplified by removing the head, scraping off the de-

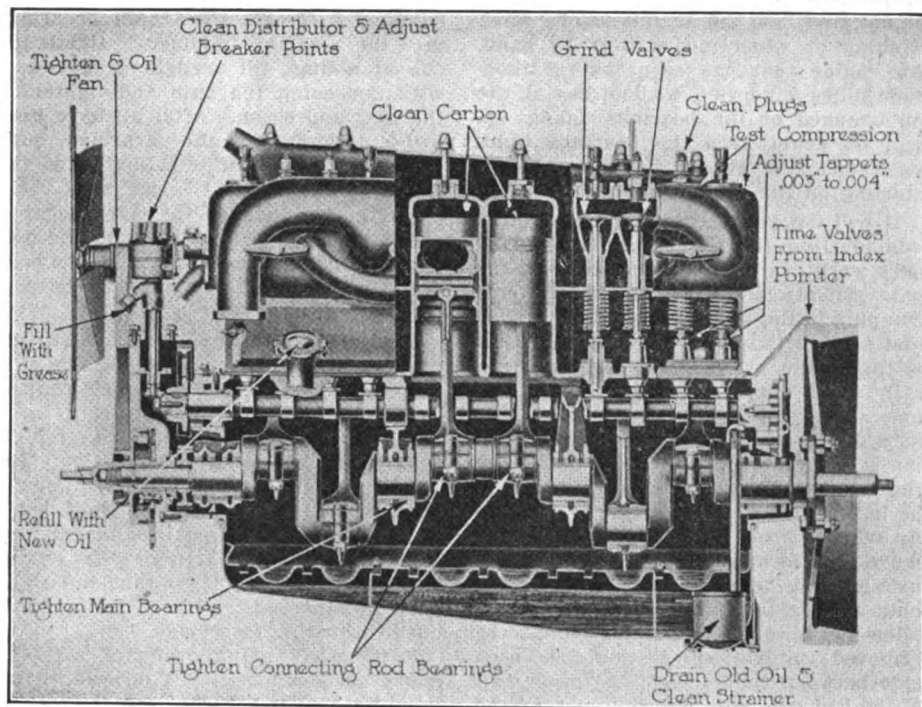


Water Circulated by Centrifugal Pump as Shown by Arrows. Refill with Fresh Water Daily While Touring.

the drain cock underneath the radiator, rinsing out with clean water two or three times to remove all traces of the solution. Removing the petcock entirely from underneath the radiator will give the larger pieces of rust a better chance to flow out with the water. After the radiator has been filled with fresh, clean water, examine it for leaks. If any are found, the radiator should be removed from the frame of the car and repaired by some one experienced in this work. The rubber water connections between the radiator and engine or pump should be examined and, if found in a softened state, should be replaced as the disin-



Components of Fan Needing Attention.



Units of Engine That Should Be Examined Before Starting on Tour.

posit with a putty knife from the interior of the head and the tops of the pistons.

The valves are ground in the head by inverting it, after the valve springs have been compressed, the holding pins taken out and the springs slipped off. As the head is quite wide it is doubtful if it can be clamped in a vise and blocking will have to be provided to raise it high enough from the work bench so that the valve stems clear it. Do not mix the valves when removing. They had best be taken out one at a time, and marked with a punch or tagged; or if they are all removed at once, as practiced by some repairers, they should be placed in the same holes they came out of so that they will not get misplaced. Grind them one at a time, using a good abrasive, smearing the face of the valve with the abrasive mixed with oil; insert in the opening and grind with a rotary motion, raising the valve every few turns to give the abrasive a better chance to cut. When the abrasive loses its cutting qualities, remove the valve and wipe off the abrasive from the face and seat, supplying fresh abrasive and repeating the operation till a bright ring, 1-32-inch wide, shows around the face of the valve and the valve seat. Wipe out all traces of the abrasive and grind the next valve in the same manner, repeating the operation till all valves are ground. It is a good plan to fit a bunch of waste loosely into the intake pipe manifold openings adjoining the valves and also the openings into the combustion chamber, but do not forget, when the grinding is completed, to remove this waste, as it is liable to be drawn into the combustion chamber and cause trouble.

If the motorist knows that the compression is good, but feels that there may be a small accumulation of carbon in the engine, he may clean the carbon out of the engine with kerosene or by burning. This is done by feeding kerosene from an

oil cup or can into the air intake of the carburetor when the engine is turning quite rapidly. Advance the spark and open the throttle just enough so that the engine does not race and will not stop when the kerosene is taken in from the carburetor. A heavy gray smoke will pour from the exhaust, but this will do no harm; the main thing to watch out for is to see that the engine turns fast enough so that it does not stop on the kerosene fuel. As kerosene vaporizes slowly, a certain amount will remain in the combustion chamber and will soften the carbon and if the accumulation is very light, it will be blown out through the exhaust while the engine is running. Allow the engine to take in the kerosene till the engine slows down as though it were going to stop. Stop pouring in the kerosene till the engine frees itself, then give it another dose, continuing to do

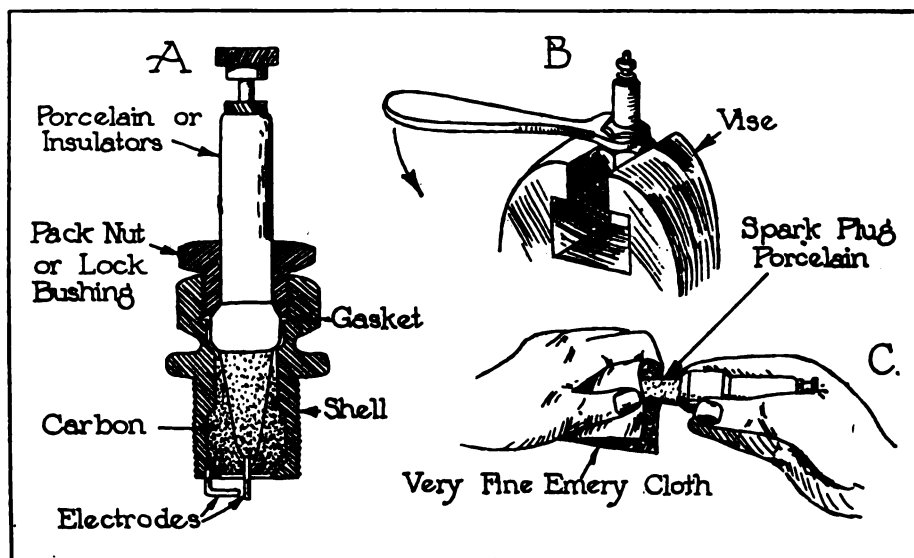
this several times or until you believe that the carbon has all been blown out of the combustion chamber. This treatment, given every 10 days or two weeks, will tend to keep an engine free from carbon and give a better running power plant.

Care of Spark Plugs.

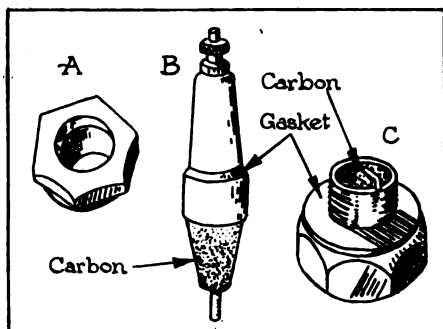
The spark plug should be removed from the heads of the cylinders, oil accumulations removed, the plugs disassembled, if possible, and the interior parts scraped and cleaned by soaking in a gasoline bath. The porcelain insulator can be cleaned with fine sand paper or emery cloth, but a better method is to soak a cloth in gasoline and wipe off the insulation with the moistened cloth. The glazed surface of the insulator will not be roughened and carbon will not collect on it as rapidly.

The points of the plug should be set correctly, after the plug has been assembled, the proper distance being 1-32-inch, or about the thickness of a worn dime. Where battery ignition is used alone, this distance may be increased, but for ordinary use, with storage battery and generator ignition, should be as above or slightly less, depending on the type of ignition.

After the valves have been ground, they are reassembled together with the valve springs, the fastening pins put in place and the head and its gasket fitted on to the engine block and held down with the tightening nuts. Some repairers believe it unnecessary to use any liquid material to seal the gasket to the iron when fitting it. Others put shellac on one side of the gasket, while still others apply shellac to both sides. Some use grease, such as is placed in the grease cups of the car; if this is too thick to handle easily it may be softened with oil to the right consistency. The objection to shellac is that, when the head is removed again, the gasket will be found stuck to the engine block and the head, making it impossible to separate them without injuring the gasket, making it necessary to install a new one. The use of grease obviates this difficulty and



Proper Attention That Should Be Given Spark Plugs: A, Sectional View of Separable Spark Plug; B, Correct Method of Loosening Porcelain; C, Correct Way to Clean Carbon Deposit from Porcelain.



Units of Plug: A, Threaded Bushing; B, Porcelain Insulator and Center Electrode; C, Spark Plug Shell and Fixed Electrode.

accomplishes the removal of the gasket without injury. All that is required is some substance that will seal the joint between the head and engine block, making it gas tight. After the head has been tightened, the engine should be started and run till warm, then the bolts are again tightened as far as they will allow. This rule applies equally as well to the valve plugs on an L-head or T-head engine, as one will find that several turns or part turns can be taken when the engine has become warm.

Valve Tappets.

The valve tappets should be adjusted if possible. Some engines are not provided with an adjustment for this purpose, while still others use a lock nut and center screw, provided with a hexagonal nut at top with a felt silencer in the center, by which the screw is turned either up or down as required to make the adjustment. Overhead valve engines are usually adjusted at the top of the push rod at a point below the ball joint connection to the rocker arm, while the L-head type is adjusted at the side of the engine at the bottom of the valve stem.

Tappets that cannot be adjusted by means of a screw, may be fitted with steel caps, having felt silencers inside the cap which fit over the end of the tappet, shortening the distance between the tappet and valve stem in proportion to the thickness of the base of the cap. These caps may be purchased from supply houses and are applied very easily by compressing the spring and slipping the cap over the end of the valve stems. The adjustment varies slightly from .003 to .004 inch, according to the engine, and is determined best when the engine is hot, for, if adjusted on a cold engine, it will be found that, when the engine heats, the valves will be held open, causing it to run very irregularly. With later type of engines, having the valve mechanism enclosed, while this is not so noticeable, it is, nevertheless, important as noisy valve action is more or less disagreeable and also prevents the valves from opening to the full extent for which they were intended by the manufacturer, thus preventing the engine developing its full rated horsepower.

Engine Bearings.

Whether the engine bearings need attention or not depends altogether upon their condition, how far the car has been driven since they were last taken up, whether the oil has been changed at

proper intervals in the engine reservoir or not, and how the engine sounds when running or when turned over by hand. An engine that has seen several thousand miles of service, without having the oil changed or the bearings taken up, will no doubt need the bearings tightened and this should be done before starting on the tour.

It will not be necessary to remove the engine from the chassis, as the necessary work can be done from beneath the car. Simply drain out the oil through the plug in the base of the engine, loosen and remove the bolts that hold the base to the engine, letting the base down carefully so as not to damage it, and set it one side. All sediment and old oil should be washed out with gasoline, leaving it perfectly clean. The bearings of the crankshaft and connecting rods will be in plain view of the repairer and easily reached from under the engine. Remove the locking wires from the connecting rod bearings, loosen the lock nuts and the nuts underneath which will allow the lower half of the bearing to be removed. Shims will be found at each side between the cap and the other half of the bearing. These should be removed carefully and washed in gasoline. Have a pan, partially filled with gasoline, handy, so that the parts, as they are removed, can be washed free of oil and grease.

Shaking the bearing sideways with the hand roughly determines the amount of looseness present, although this is not an accurate test. The better way is to separate one or more of the thin shims from each side, putting the remainder back in place on the stud bolts, replacing the bearing cap and nuts, and tightening the cap as much as possible with the nuts. Rotate the crankshaft by hand, noting if it turns too hard or meets with considerable resistance. If so, remove the cap and place another thin shim at each side, tightening as before. Test with the starting handle and, if slight resistance is met with, the bearing is about right. Loosen the nuts and tighten the next

bearing in the same manner, till all are adjusted. Treat the main bearings in the same manner, tightening one at a time, till a slight drag is met with, loosening the nuts and tightening the next and so on. After all have been fitted, tighten all the bearings sufficiently, fit the lock nuts and wire the holes in the end of each stud bolt, twisting the ends of the wire between each two pairs of stud bolts on the connecting rod bearing caps and between each four stud bolts on the main bearing caps.

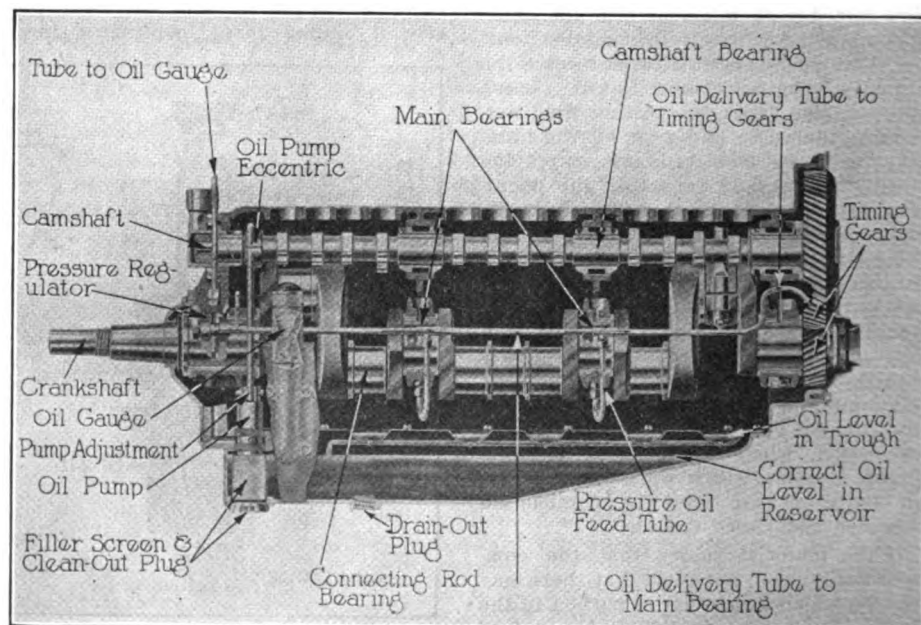
Next replace the base of motor, fitting new gaskets, if necessary. If made of felt, secure new ones and fit between the halves of the base.

Fill the engine reservoir with fresh oil to a point somewhat higher than that when running the car normal. Usually from a pint to a quart is sufficient, but a large engine will require nearer two quarts. The object is to give the engine an over-supply of oil so that the tightened bearings will work in freely, without overheating or scoring.

If the car cannot be started with the starter or hand crank, it is best to tow it with another car, starting the engine on high gear by letting the clutch in easily as the car is towed, this turning the engine over through the rear wheels.

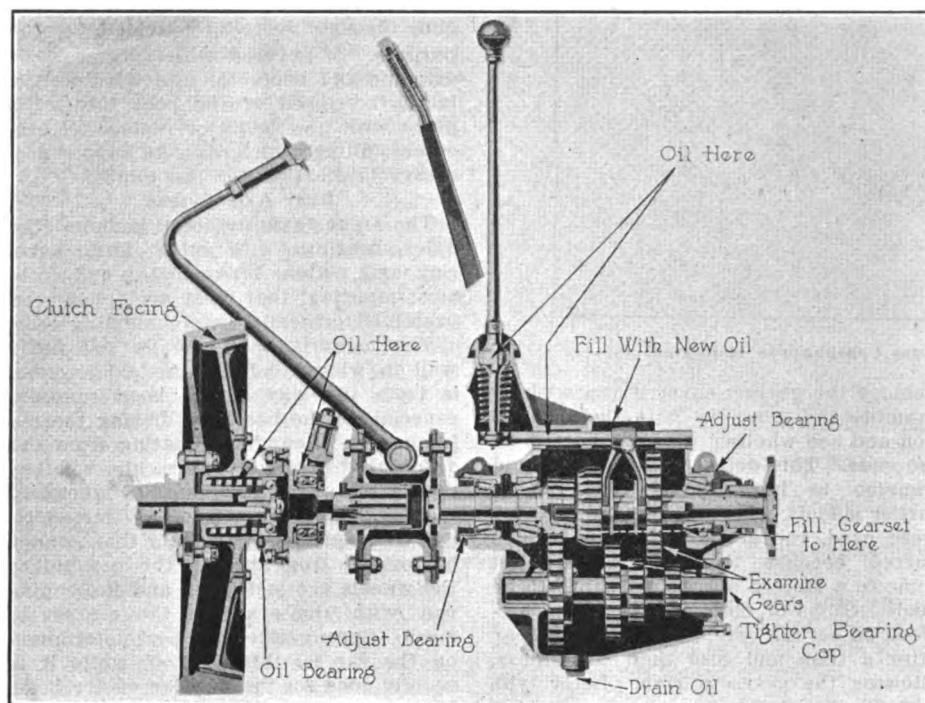
EFFECT OF UNDER-INFLATION.

A tire, when not inflated to proper shape, under weight of the load, is more elastic and resilient. This resiliency, however, is secured by increased action in the side walls, which produces heat and softens the rubber cement or adhesiveness on the fabric layers. In a sense de-vulcanization takes place. When soft from under-inflation the tire runs against a wave in the tread rubber and excessive stretching and heating results in separation. Too much deflection in the tire means an irregular tension of one layer of fabric in relation to another—they pull apart, chafe and later, when striking a stone, rough place or rut, blow out.



Components of the Engine Base Needing Attention Before the Tour Starts.

The Proper Adjustment of the Clutch Is Important



Cone Type Clutch and Gearset, Indicating Parts Needing Attention Before Starting the Tour.

THERE is nothing that is more aggravating to the motorist when touring than a clutch starting to slip. A grabbing clutch is disagreeable, but one that slips is considerably worse. A slipping clutch is best determined by driving a car up a grade and noting whether the engine accelerates and does not increase the speed of the car. If such is the case the engine will seem to race when the throttle is opened beyond the speed of the car, instead of the movement of the car materially increasing.

Adjusting Clutch, Cone Type.

Adjustment of a cone clutch can usually be made on the short rod which connects the lower end of the clutch pedal and the pull-out arm of the clutch collar. To gain greater freedom of movement of the cone, springs located in the rim of the clutch can be drawn in tighter, allowing the cone to enter further into the rim. A grease cup is provided in the hub of the clutch, which lubricates the internal bearing. This cup should be kept filled with grease and turned down according to the instructions of the manufacturer. The bronze collar which pulls out the clutch may have become worn through lack of lubrication. This collar may be turned and adjustments made so that further service can be had from it. If worn too badly it should be renewed.

When fitting a new pull-out collar, see that the lubrication is supplied every other day for two weeks or until the high spots are worn off. After this period it requires lubrication less often. Steam cylinder oil is the best lubricant.

Multiple-Disc Type.

In a multiple-disc clutch of the dry type this trouble may be caused by the motorist driving with one foot resting on the clutch pedal and is called "riding" the clutch. There is a tendency among experienced drivers to do this with the result that the weight of the foot is just enough to allow the plates to separate slightly, causing them to slip. A driver will at times exert more pressure on the pedal than he realizes and its continued practise will in time cause slippage of the clutch, even though it is in as far as it will go. Make it a rule to keep the foot away from the clutch pedal when the clutch is not in use.

The chief cause of the clutch slipping is wear between the frictioned surfaces of the clutch and the steel plates. Slipping will cause the frictioned surfaces to heat needlessly and wear rapidly. Riding the clutch pedal increases the liability to heating.

Provision is made, when constructing the clutch, for its adjustment, and the directions in the instruction book of each car will tell how this is done with that particular machine. As the method varies with different makes of clutches, no set rule can be given that will apply to all. If the frictioned surfaces are badly worn and adjustment of the clutch is impossible, the only practical course is to remove the clutch and refit new friction surfaces, adjusting the clutch after the plates have been recovered. Certain makers provide adjustment for their clutches by means of a rod connecting the lower end of the clutch pedal with

the clutch collar pull-out arm. Lengthening or shortening this rod will give the desired adjustment. Still other manufacturers adjust this member by three nuts on the front of the housing, these being tightened in rotation, a turn each at a time. It is a good plan to wash off the plates, before adjusting, with gasoline to remove any accumulation of oil or grease.

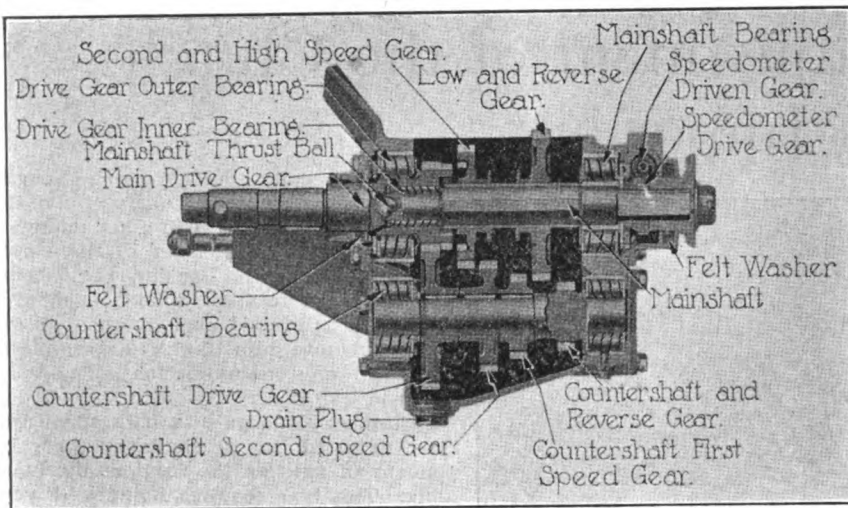
Clutches that run in a bath of oil may be adjusted in a similar manner by means of nuts on the front of the housing. This type requires filling with very light oil at frequent intervals in order for the clutch to do its work properly. Ordinary light engine oil and kerosene make a lubricant of about the correct body; half kerosene and half light oil works best. As this type of clutch has been discarded for the later or dry disc, it will not be found to any extent in the later models. If it is found that the discs are badly worn they should be removed and new fitted. As usually steel and bronze discs alternate steel against bronze and wear is quite rapid between the softer surface of the bronze and the harder surface of the steel with the result that the discs will score rapidly and soon be unfit for use.

Cone Clutch.

As there are many cars on the market at present equipped with the cone clutch, brief mention will be made of this type. The cone clutch is faced with either leather or a manufactured material, which gives the necessary friction surface. Wear is not very rapid, but this type usually develops the defect sooner or later of grabbing, in some instances fiercely. This is due to the frictioned surface becoming very dry through lack of oil. If leather faced, neatsfoot oil may be applied whenever the clutch grabs to soften the leather and make it pliable. The leather facing will also wear, and especially rapidly if the operator is in the habit of slipping the clutch when passing through traffic or changing speeds. If wear is present and the clutch fails to hold when ascending a grade, an application of fuller's earth.



Method of Adjusting Countershaft Bearing, Reco Gearset.



Modern Gearset Using Roller Bearings; Components Indicated.

which will dry out any excess oil moisture, will usually correct the trouble, but if worn badly the clutch should be adjusted by shortening the distance rod between the lower end of the clutch pedal and the top of clutch collar arm, allowing the clutch to fit more deeply into the beveled edge of the balance wheel. If this does not correct the defect the lining is probably worn so badly that adjustment cannot be made without removing the lining and this had best be done by an experienced repairer. If done by the motorist care should be taken to have the lining fit correctly, the rivets driven down into it and the ends of the rivets headed over so that they will not become loose and scratch the inner beveled surface of the balance wheel.

On all three types of clutches will be found one or two compression grease cups, which should be kept filled with grease and turned down at intervals. These supply lubricant to the inner bearings of the clutch and if allowed to become empty the ball bearings will not have lubrication. Dry disc clutches do not use oil in any form on the clutch surfaces, the only lubricant supplied being that in the compression cups.

Clutch pull-out collars require frequent lubrication, as it is the function of the collar to pull out the clutch and hold it out while the gears of the gearset are being changed. The collar is usually made of bronze and bears hard against the steel flange attached to the clutch shaft. Unless lubricated often wear is very rapid, with the result that the clutch pedal will chatter under the foot when shifting and the bronze and steel surfaces will heat rapidly. For the first 10 to 14 days after a new car is put into use this bearing must be oiled with steam cylinder oil at least once every other day. After this period it will require attention less often.

If the collar is badly worn it may be turned, presenting a new surface to the steel flange, or a new collar can be fitted.

The Gearset.

The gearset and the slides connected to the hand lever which operate it should be examined and lubricated, as a hard working gearshift makes touring anything but a pleasure for the driver.

Remove the gearset cover if you wish to examine the gears to note their condition and see whether they are burred on the ends. This defect will not be found common in later model cars, but in earlier models, where oil or cone clutches were used, the gears were liable to be burred because the clutch would not come to a stop to allow gear shifts to be made. Stops or clutch brakes were provided on certain cars. These would wear after a time and lose their usefulness, allowing the gears to spin. Later type cars fitted with dry disc clutches are not so liable to develop this trouble, although it may happen.

If the gears are burred they may be removed and the points of the gear teeth smoothed off with a file or the points ground to a bevel on an emery grinder. Remove the oil or grease in the gearset case through the drain-out plug at the bottom and wash out with kerosene to remove all sediment. Replace the gears in the case, refit the cover and fill with fresh oil to an inch below the level of the main shaft. Steam cylinder oil is recommended for this purpose as it is a heavy, thick bodied oil which sticks to the gear teeth and thoroughly lubricates the gears and bearings. Worn gears, bushings or

bearings should be replaced at this time as the motorist would not care to attend to this work when on a pleasure tour, as it would cost a day's trip.

Universal Joints.

Examine the universal joints, noting whether or not they are worn excessively, and supply fresh grease with a grease gun, through the plug provided for the purpose. If covered with leather boots examine the boots to note whether the lacing is ripped or the boot torn. Replace with new boots or replace as necessary, filling with grease to supply necessary lubrication for the joints.

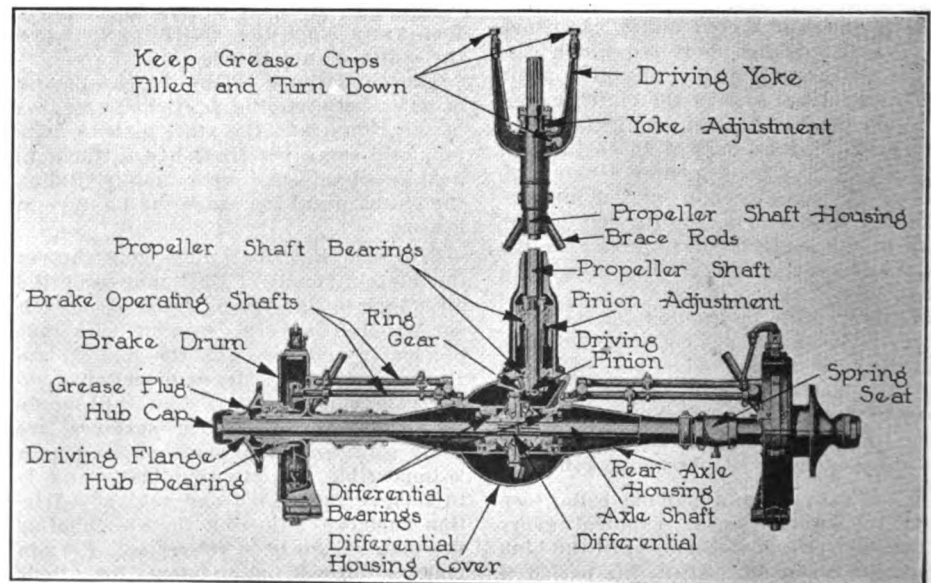
Rear Axle System.

The rear axle system includes the axles, bearings, differential, large bevel ring and pinion, brakes, etc., and it is very important that these components be examined critically before starting tour.

The motorist can usually tell fairly well in what condition the axle system is from the way it has been running, especially if he has been driving the car frequently. Sounds emanating from the differential case will inform him whether the gears are running short of lubricant, are too deeply in mesh or too far apart. But there are a few defects that cannot be located from driving the car unless the wheels are jacked up and the engine run with the gears of the gearset in mesh. Sprung axles are best determined on the car by this method, while it is equally good for the location of dry bearings, worn thrust bearings in the differential or broken teeth on either the large bevel ring or the bevel pinion which drives it.

If there is no sound from the axle system it can be taken for granted that it is in good condition and all that it will probably require is a fresh filling through the differential housing plug of steam cylinder oil to the level of the plug opening.

On the other hand, if unusual sounds are heard, the motorist is wise who decides to disassemble the system and locate the trouble. As each part is removed examine it carefully for wear, breaks, etc. If worn excessively, replacement is necessary.



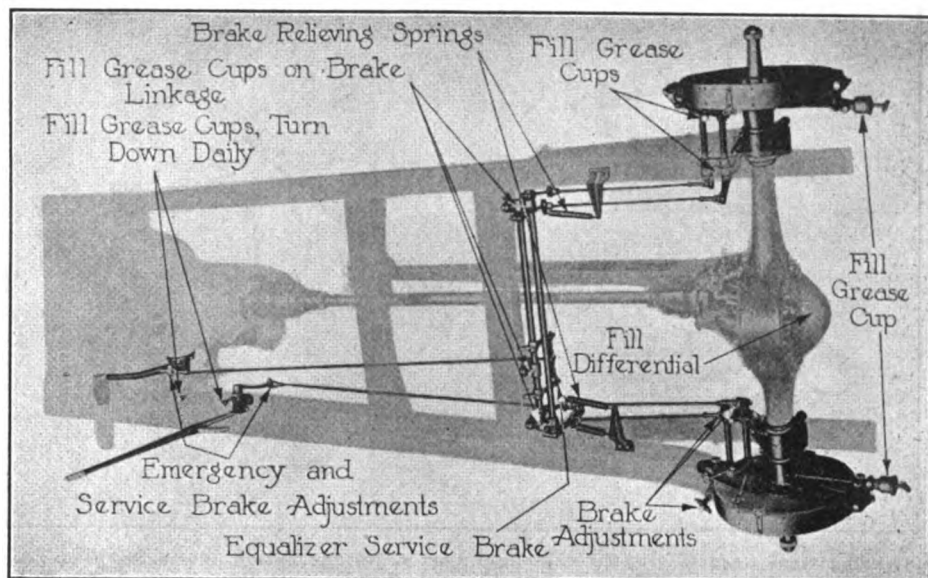
Buick Little Six Rear Axle; Full Floating Components Clearly Indicated.

Wabbling motion of the wheel and axle as it is being driven by the engine denotes that the axle shafts are sprung. Sometimes this is caused by the demountable rim not being fitted correctly to the wheel felloe band. Examination of the rim where it is fitted to the felloe band will determine whether this is the case. Sprung axles should be removed and either straightened or new axles fitted as they cause excessive wear of the tires, giving a sidewise motion similar in effect to the action of sandpaper, which soon wear through the tread of the tire.

The large ring gear, if chipped on the edge of the teeth, can be removed and the teeth ground to a bevel on a grinder, reriveting the gear to the ring of the differential as it was originally. Make sure that the rivets are tight and will not work loose. If there is a possibility of this happening it may cause more or less trouble later. Be sure that the large ring gear or bevel and the bevel pinion are adjusted so that they mesh correctly. They should not be too deep so that they growl, neither should they be spaced so far apart that only the points mesh. They should be adjusted so that the teeth do not reach the bottom of the mesh, but just clear it by a few thousands of an inch. This can be tested with the differential cover removed and the engine running slowly, with the gear-shift lever placed in high gear after the car is jacked up, at both rear wheels. If the adjustment is correct the cover is replaced and the case filled with steam cylinder oil to the filling plug.

Adjusting the Brakes.

The brakes are really the most important unit in the car from a touring standpoint, for on them many times depends the lives of the occupants of the car. The engine may be high powered and able to take the car anywhere at any time and at any speed, at the same time being in perfect working condition, but if the brakes are not in proper working order the car is really useless, for if the driver is not able to control the speed of the car through the brakes, or to stop it in case of an emergency, the power plant will be of little value. Good brakes, set properly and kept in a proper working condition are a necessity and the motorist contemplating a tour, whether of a



Components of Modern Passenger Car Brake Linkage.

long or short mileage, will do well to examine them carefully.

While the car is on the jacks have some one sit in the driver's seat and press the pedal controlling the service brakes. Grasp the spokes of one wheel with the hands and try to turn the wheel against the resistance of the brake. Try the other wheel in the same manner, and if it is found that the wheels turn against the brakes with the pedal depressed as far as it will go, the brakes should be adjusted.

The emergency brake should next be applied in the same manner and its resistance tested against the turning of the wheels. If the wheels turn the brakes need readjusting.

Unless the brake lining of each set is worn thin the brakes can be readjusted without much difficulty. By having another person in the driver's seat depress the service brake pedal the repairer or motorist can lie under the car and note which rods the lever operates. On the end of the rods, joining the brake arm through a yoke and pin, held with a cotter, one will notice a lock nut, which tightens against the end of the yoke, and several inches of thread. Loosening the lock nut and turning it back on the threads allows the yoke, after it has been

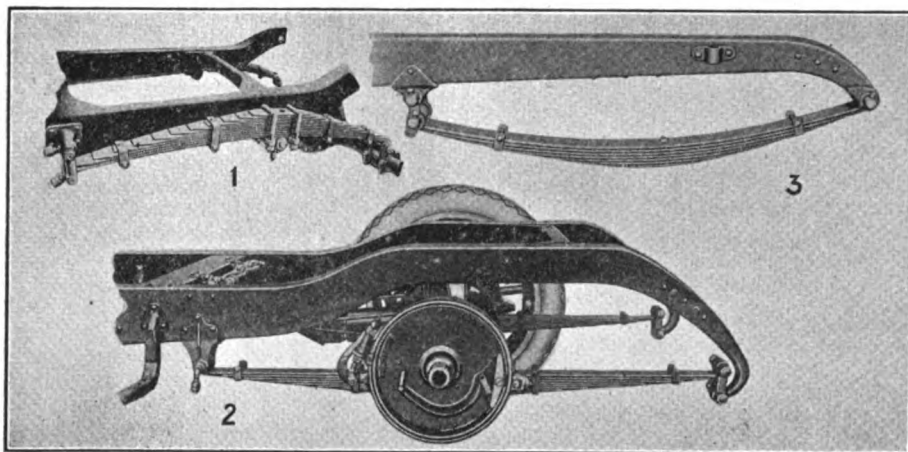
disconnected from the brake arm, to be turned over till the required adjustment has been made. The rods should be taken up on each side, the yokes fitted in place on the arms and the pins inserted through the arms. Depress the pedal and try the wheels, if they lock with the pedal depressed about $1\frac{1}{2}$ to two inches from the floor boards, they are properly adjusted.

Adjust the emergency brakes in the same manner till the wheels cannot be turned against the resistance of the brakes. They are said to be locked when this condition prevails and will work under emergency conditions. Be sure that all oil holes on the brake linkage are open and supplied with oil so that they work freely. If the brake linings are worn thin the bands should be relined and the brakes readjusted after they are fitted to the wheel drums. While touring the motorist should make it a practise, especially in a mountainous country, to jack up the wheels every other day, and try the brake adjustment. It may be found that brakes will wear unevenly, causing one wheel to slide when the brakes are applied and the other wheel to turn freely.

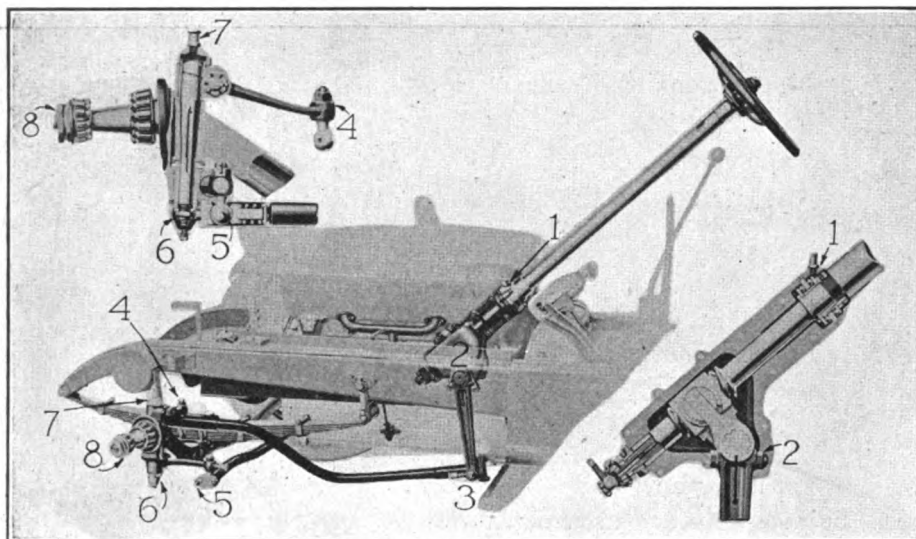
If the car brake linkage is equipped with equalizers this condition will be taken care of by them. Many cars, however, are not so equipped and it becomes necessary to correct this condition before tire damage takes place. Frequent inspection will locate this defect and it may be corrected as soon as discovered. If allowed to continue for any length of time the tire on the wheel affected will show a worn spot on the tread, which will soon penetrate through the tread to the breaker strip and so into the fabric of the tire, causing water and dirt to enter and rot the fabric and ruin the tire.

Attention to the Wheels.

At this time the wheels both front and rear should be carefully examined to see that the spokes are not damaged or loose in the hub. Screwing up the hub bolts will tighten the spokes in the hub, unless they are so loose that they work in the hub, in which case wedging between



Springs Used in Modern Car Construction; 1, Cantilever; 2, Underslung, Semi-Elliptic; 3, Semi-Elliptic Front Spring.



Steering Gear Used in Modern Passenger Car: 1, Nut Adjusting Worm and Gear; 2, Pitman Arm Clamp and Bolt; 3, Drag Link; 4, Pitman Arm Ball Joint; 5, Tie Rod Ball Joint; 6, King Bolt; 7, King Bolt Grease Cup; 8, Nut Adjusting Wheel Bearings.

each spoke is necessary, either with strips of wood forced in or strips of metal glued in between. This condition is rarely found in modern passenger cars, but may develop during extremely dry weather. Note whether the wheel runs true; if it does not it should be removed, taken to a wheelwright and straightened. Note the condition of the wheel bearings; if lacking lubricant see that sufficient lubricant is supplied, according to the instruction book.

Springs, Shackles, Etc.

Examine the springs and shackle bolts carefully. Leaves that are broken should be removed and new fitted. The springs should be opened by jacking up the body under the frame, the faces of the spring leaves smeared with graphite and oil mixed to a paste and spread on with a thin knife or hack saw blade. Spring leaves will become dry after a period of use, requiring lubrication at intervals to cause them to work properly. Oil applied at the sides of the leaves will not center sufficiently to lubricate the surface of the leaves where the greater part of the work is performed, but will simply lie along the side, collecting dust and appearing very unsightly. Jacking up the body or spreading the leaves with a spreader enables the lubricant to be applied directly to the leaves.

Shackle bolts will become worn through continued use if lubricant is not applied at proper intervals. Examining the bolts by removing them will determine whether or not new bolts will be required or whether cleaning the oil ways in the bolts and supplying fresh lubricant in the form of grease through the compression cups will be sufficient. If worn too badly they should be renewed as partial worn bolts are liable to break unexpectedly, causing inconvenience.

Chassis bolts and nuts may need tightening, as they will with the best of driving, gradually work loose. Tightening them at this time will give the motorist the assurance that they will be all right for some time.

By all means do not forget to examine the steering gear and the connecting joints, to note and remove all excessive

play in these components.

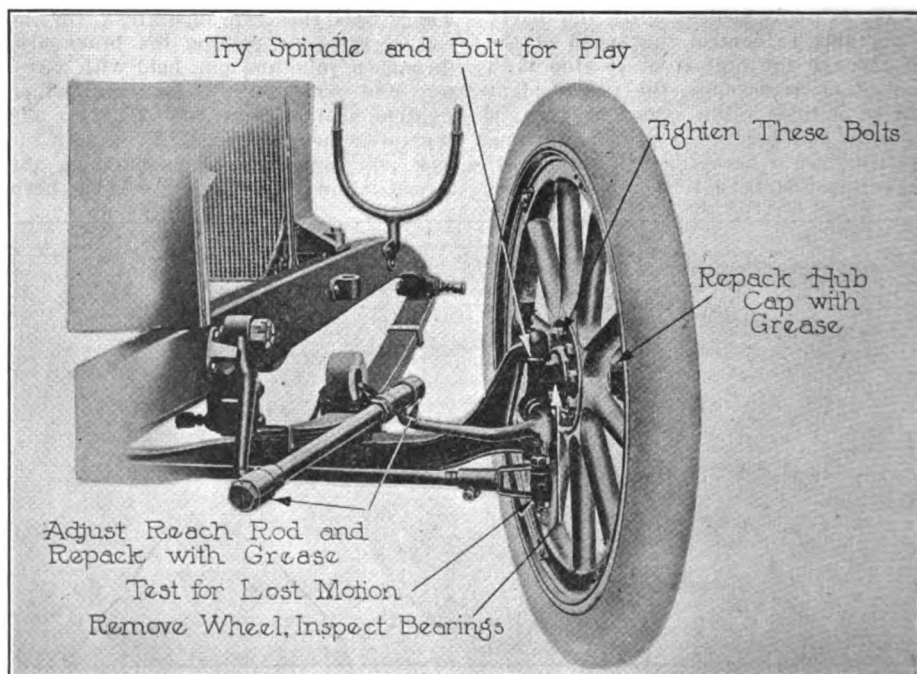
Wear is most likely to occur either at the bottom of the steering post in the worm and gear or worm and nut as the case may be and can usually be removed by adjusting the worm and taking out the looseness. Play may be found at the Pitman arm, outside of the car frame, where it is attached to the squared end of the shaft from the worm and gear case. Oil enters around the shoulder of the arm causing the nut to loosen on the clamping bolt, allowing the arm to work loose and giving considerable play to the steering wheel. Tightening the clamping bolt will obviate the looseness and take the play out of the wheel. Wear also occurs between the ball ends of the steering connecting rod. Adjustments are provided at each end by which the socket may be tightened against the ball, while a spring at either end supplies proper tension on the ball joint. The ball requires lubricant at intervals,

grease being used for the purpose.

The bushings at either end of the tie rod yokes will wear and also the bushings in the steering arm ends which join the tie rod yokes. Oil or grease is supplied to these bushings from compression cups threaded at the top of the tie rod bolts and passing through an opening drilled lengthwise of the bolt to one drilled at the side of the bolt adjoining the center opening, allowing the lubricant to work out into the bearing, and supply proper lubrication. Oil ways of this nature occasionally become filled with hard grease, preventing the bearing from receiving the lubricant. Rapid wear of the bushing results and looseness of the yoke follows. Examine the yoke for play and if found disassemble. Remove the bushings and refit with new. Clean out the oilways in the bolt with wire and supply fresh lubricant to the compression cup.

The same method should be followed for the king bolt which fastens the wheel spindles to the I beam axle. Bushings are fitted at the top and bottom, lubricant being supplied from a compression cup at the top, through a hole drilled lengthwise of the bolt, opening into a spiral groove that runs the length of the bolt on the outer side. Cleaning out the oil way, fitting new bushings, if worn, and a new king bolt if worn badly, will take out the looseness.

After the car and its units have been thoroughly examined, worn parts renewed wherever necessary, looseness of the working parts eliminated and the car put in as near perfect condition as possible, the item of lubrication should be checked over very carefully to see that no unit that requires lubrication has been neglected. The oiling chart which accompanies every car when it leaves the factory will be of great assistance to the motorist in this work, as each unit is plainly marked, showing the grade of lubricant to be used and how often lubrication is necessary.



Components of Front Axle Showing Parts Needing Attention.

Hints to Motorist on Selection of Camp Site and Spare Equipment

NEW ENGLAND has often been called the "Tourists' Paradise" when its charms are described, and this term applies equally as well to motor tourists, for within its borders are found

bedding. The veteran camper is always careful to select a site for his sleeping quarters where the water, in case of a sudden shower, will drain away from and not into the tent. It is one of his

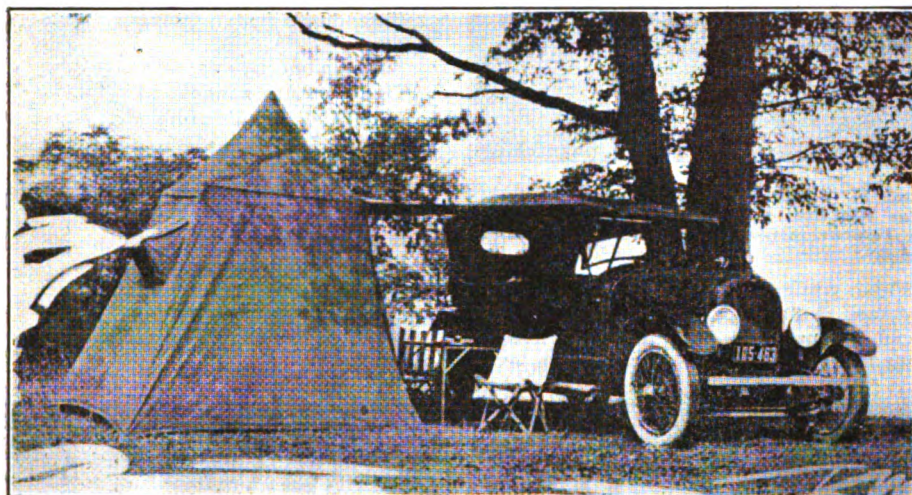
in the party, let him assume the duty of keeping the larder supplied with fresh fish. Others can divide the honors of walking to the farm for supplies, preparing wood for the camp fire, cooking, dish washing, etc. If these several necessary tasks are shared among many hands the labor devolving on each will be negligible and not be found to be drudgery for anyone.

One of the most important requisites for an ideal camping ground is that it be handy to the vicinity of an abundance of good, cool drinking water, and a nearby stream or pond for bathing will be found among the pleasures, to say nothing of boating, fishing, etc., if any extended stop is made.

The work of unpacking and getting the camp in order should prove a pleasure rather than a hardship to anyone enjoying out-of-door life, providing a little planning of the arrangement of the equipment and division of labor is made before hand. The work should not be made taxing on any member of the party, for that will defeat the very end for which the trip was planned. The work of packing in the morning should be planned and carried out in a systematic manner so that articles needed and to be unpacked first at night should be packed last when breaking camp.

If a trailer be used to carry the tent and supplies, the car will be left entirely free for the passengers but, as many tourists prefer to do without a trailer, carrying the tent and luggage bags on the running boards and mud guards of the car, with food, etc., packed in a trunk at the back, some room in the car must necessarily be sacrificed.

The great out-doors is nature's own sanitarium and jaded city dwellers can get more benefit from a few days so-



Very Popular Automobile Tent, Erected at a Short Distance from Car, Is Connected to Auto by a Fly, Providing Shelter.

many spots that will prove attractive to automobile camping parties. Upper New York state, through the Adirondack and Catskill mountains, as well as the Alleghenies of Pennsylvania, offer unlimited picturesque camping sites; and, in fact, they may be found in almost any section of the United States and Canada.

Many suitable spots for camping may be found within a few miles' radius of any of America's principal eastern cities, even along the main arteries of travel, but to discover the really ideal location, where all the conditions are as they should be, the motor camper should leave the beaten paths of travel, taking some side road at night fall and following it for a distance until a site is reached that appeals to all the members of the party.

Some inexperienced campers are under the impression that a camp is best situated among trees where a rank growth of grasses or ferns may be found. However, mosquitoes are very liable to be annoying in such locations and, besides, the dampness that is sure to be present will cause the tent and bedding to become moist, taking a long time to dry out in the morning.

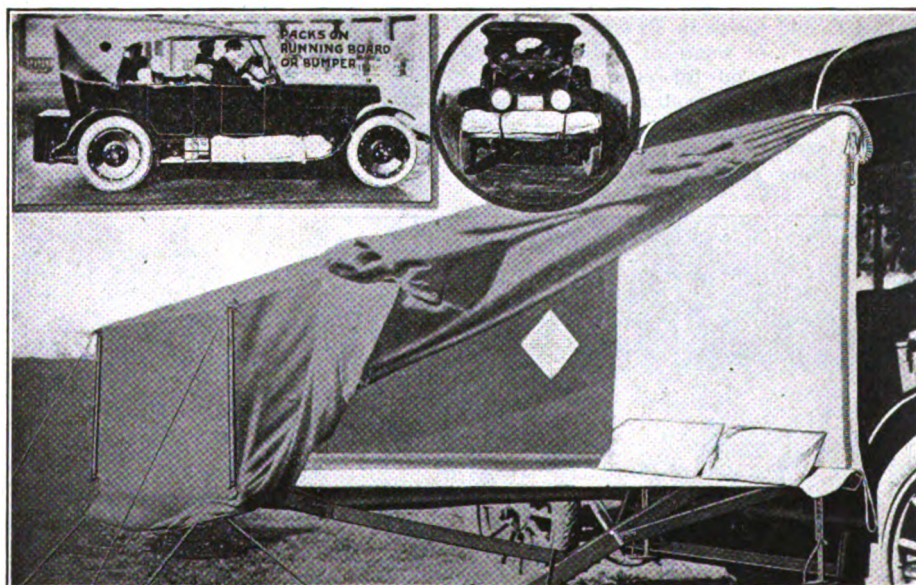
The motorist will do well to pattern after the gypsies, as these nomadic people have, for centuries, been living out of doors, till the choosing of a suitable camp site has become an instinct with them.

It is best to choose a spot somewhat elevated and, if possible, east of a group of trees where the early morning sun will dry the tent and bedding while breakfast is being prepared. Moist canvas and bedding are liable to cause the members of the party to catch cold and, in time, the mildew that gathers will rot the tent and

first cares to dig trenches around the tent site so that in case of a rain storm the water will be conveyed away.

Among the points to remember is that the flaps of the sleeping tents should be kept closed until bed time in order to keep mosquitoes and flies from getting in and causing annoyance. Lamps should be used as little as possible as insects are attracted by the light.

If possible, pitch camp near a farm house, where eggs, milk, fresh vegetables, fruit, etc., can be obtained with which to vary the regular tinned menu of the camp diet. If there is a fisherman



(By Courtesy of Auto Bed Camp Manufacturing Co.)

Another Type of Automobile Tent, Packs in Small Space on Running Board.



New Type Auto Traller Constructed According to Plans Suggested by Glenn Curtiss and Incorporated in an Earlier Model for His Use. The Traller Is Now Being Manufactured for the Trade but Has Many Improvements Not Found in the Earlier Model.

journey "among the green pasture and beside the still waters," than from a whole season at some crowded, fashionable watering place and at only a slight proportion of cost.

Spare Parts Required.

The question of spare parts and tools will naturally arise as time of departure draws near. The matter of extra tools can be easily settled after looking over and checking the tools of the car. A full set of tools accompanies each car that is shipped from the factory, but as the car is used some of these become either lost or broken. Checking over what are left will show those that are lacking and these may be purchased from a supply house. A good heavy hammer is frequently needed to remove rims. Be sure of the weight of this particular article. A small square of planking will often be found essential in changing tires on sandy or muddy roads where the jack will sink into the loose soil. A strong handle should also always be provided with the jack. A folding pail should be in the car, for sometimes water is not to be had except from a creek along the roadway and one should always be prepared to add water in an emergency.

A quantity of waste or rags should always be at hand for cleaning delicate parts of the car, as well as the operator's hands. A little gasoline will assist in removing grease or dirt.

A tow rope should always be in the car

when going any distance. It not only comes in handy in case of accident, but can be used to wrap around tires on muddy roads or deep sand. An extra

set of light bulbs and fuses should be carried as part of the tourist equipment.

The following list of spare parts to be carried in the car tool box is suggested by a veteran tourist:

Wrench for adjusting ignition interrupter points.

One set of ignition brushes in a box, labeled.

File for cleaning ignition interrupter points.

Several extra spark plugs, cleaned, adjusted and ready for use.

Tow rope.

Half dozen valve plungers for inner tubes.

Three-in-one tire valve tool.

Tire pressure gauge.

Jack and handle (do not forget the handle).

Squirt can full of oil.

Voltmeter or hydrometer for testing condition of battery.

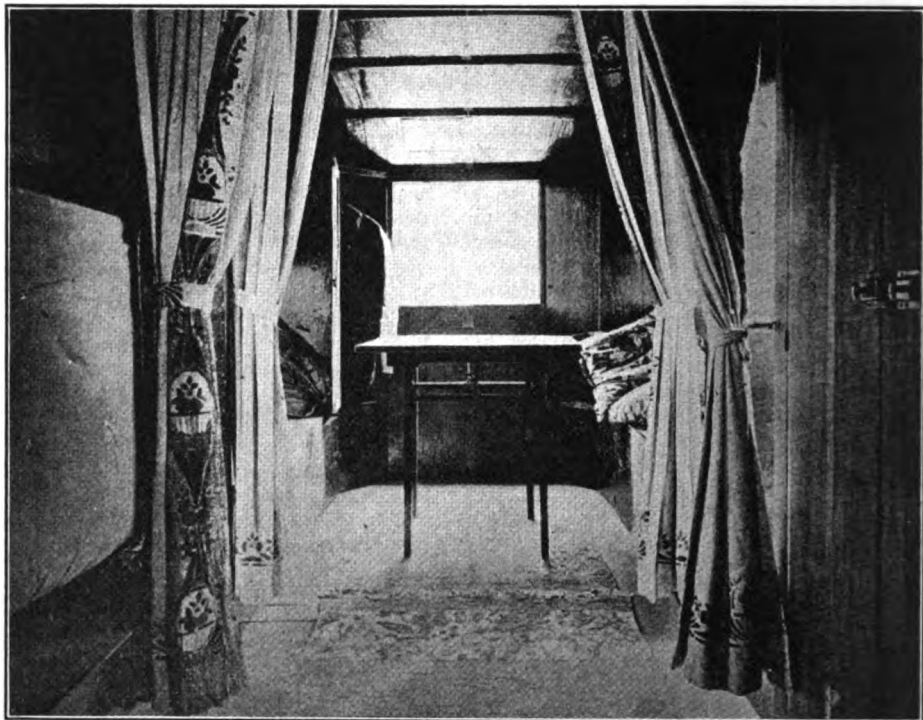
Box assorted nuts.

Box assorted cotter pins.

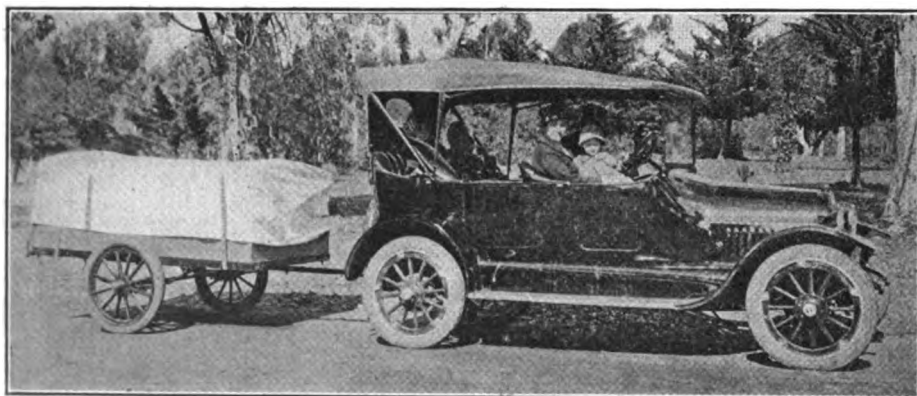
Box assorted cap screws.

Box assorted washers.

Spool of copper wire and one of soft iron wire.



Interior of the Curtiss Auto Traller or Caravan Showing the Appointments.



Marx Trailer Packed and on the Road Being Towed by Passenger Car.

Full set of electric light bulbs.

Bag of clean waste or rags.

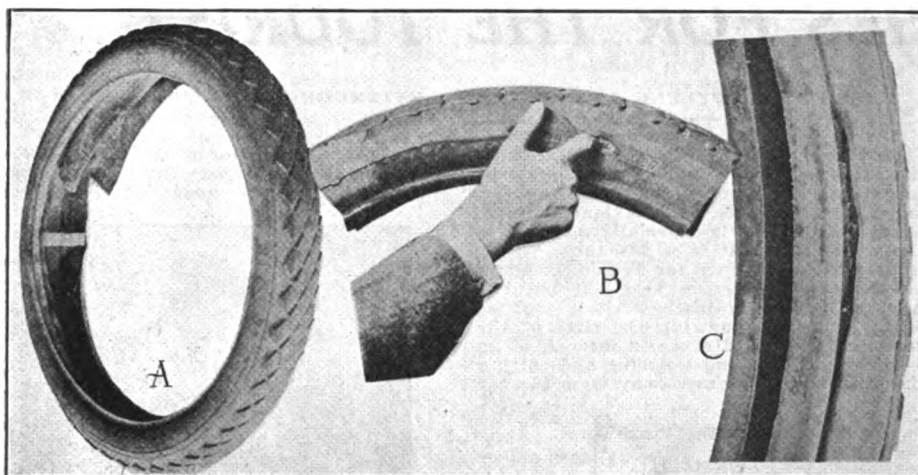
Two blocks of wood, 6 by 12 by 1 inches.

Full set of fuses, if fuses are used.

Folding pail.

Chain tool and several cross links.

Many other articles might be added to this list, depending upon the individual ideas of the motorist as to what he will need, how far he intends to travel and whether or not he intends to camp by the way side. If the latter is planned tents, bedding, camping utensils, etc., will be needed. These may be purchased from the various supply houses dealing in camping supplies. Outfits of this kind fold into small space, can be



Condition of the Tires Should Be Noted: A, Inserting an Interliner; B, Indicating Blowout; C, Tire Rim Cut by Being Run Under-Inflated.

carried on the running boards or mud guards of the car, while the supplies of canned food, etc., and the cooking utensils may be packed in a large trunk fastened at the back.

Additional carrying space can be had by using a trailer, which can be attached to the rear axle housing or under body part of the car and will be available nights for sleeping accommodation, etc.

Motorists in some instances make or purchase very elaborate trailers or caravans, complete in appointments, and even luxurious as to the interior fittings, including a dining room, kitchenette fitted with stove, several sleeping berths with mattresses, cushions, lockers, etc., and equipped with electric lights and running water.

The range of choice of touring outfit is limited only by the price desired to be paid. Many of the tent outfits are novel in design, embodying features that adapt them for use with the passenger car. The larger tents are made so that the car can be housed at night, side sections being added which give sleeping and dining apartments at each side of the car, while the cooking may be done either over a fire in the open air or by means of a gasoline or kerosene stove especially designed for campers.

Food, Extra Clothing, Etc.

Concentrated food, such as tea, Saxin, which is claimed to be several times sweeter than sugar, extract of beef, canned goods of various kinds, preserves, bacon in jars, various cereals and breakfast foods, powdered milk, powdered eggs and many others which can be obtained in this form, are easily packed in small space and prove palatable. Fresh milk, eggs, poultry and vegetables may be purchased from farmers along the route, while fish can frequently be caught from lakes and streams along the route.

Collapsible boats can be purchased which fold into small space and fit along the running boards of the car or on the top of the guards. One of these would prove handy when camping near a lake or pond, or for fishing trips.

Extra clothing should be included in the equipment, as there will doubtless be cool evenings and days which will call for extra wraps. A good camera will sup-

ply delightful souvenirs in the way of picturesque views.

Condition of the Tires.

The condition of the tires is an important factor in the general preparation for touring, for the pleasure will certainly not be unalloyed if tire trouble is encountered. Tires that are old or in a weakened condition should never be used on a tour, as in this condition they will not give the expected service and will sooner or later in all probability give trouble.

See that the tires are in perfect condition; if not, equip with new tires and possibly with new tubes as well. Inflating the tubes to round them out and immersing in a tub of clear water will show their condition quickly. If leaking, as will be shown by bubbles rising from the tube, they should either be repaired by vulcanizing or new supplied if they are beyond repair.

Carry along one or two extra tires, as you may be far from a place where they are sold when one is needed badly. A tire kit, including acid cure cement, patches, tire putty and a small vulcanizer, will come in very handy for re-

pairing tubes and cuts in the outer tread of the tires.

Top and Side Curtains.

The wise motorist will plan to have the car top in such condition that it will shed water from summer downpours as well as keep off the sun's rays. The side curtains should be looked over, the rear curtain lights repaired, if broken, and rents sewed or new curtains supplied. The button holes should be repaired, fasteners attached wherever necessary and car top, if faded, redressed. Mohair tops require a dressing composed of different ingredients from that suitable for leather or imitation leather tops. For this reason, when purchasing a dressing, specify for which kind of a covering it is to be used.

A Few Precautions for the Motorist.

Other motorists have the same right to the road as yourself; bear this in mind when ascending a grade over the top of which you cannot see. Keep to the right until a point is reached where you can look over the top, as another motorist may be coming up the other side.

Do not take a steep grade at high speed, trying to force the car as far as it will go, thereby endangering other vehicular traffic on the grade. Other motorists may be startled as you rush by and may ditch or damage their cars.

When descending steep grades alternate the use of your brakes; use the service brake awhile, then change to the emergency brake, thus preventing their heating and charging. Shifting into second or even first and shutting off the ignition of the engine offers the use of a very powerful brake and saves the wear of the brake linings. Very stiff grades can be safely negotiated by shifting the gears into reverse at the top of the grade and checking the speed of the car by means of the clutch and engine.

Tours are best enjoyed at a moderate speed, 20 or 25 miles an hour.

It is the duty of the driver to always exercise forethought, wisdom and caution.



Marx Trailer Opened for Use at Camping Site.

ACCESSORIES FOR THE TOURIST

MAZURA WOOD-BURNING CAMP STOVE.

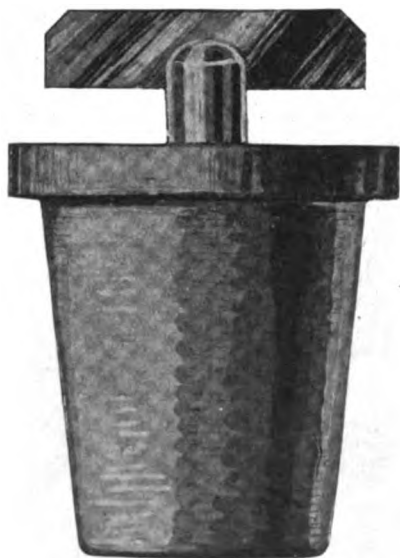
The Mazura Manufacturing Co., 414 South Sixth street, St. Louis, Mo., is marketing a wood burning camp stove of the folding type, No. 50, which is designed to be used with an ordinary camp fire. The device consists of a steel grate which is raised from the ground by four steel legs



and is provided with shields at the sides. The stove is placed over the hot embers of the fire, the sides concentrating the heat upwards to the grate, while the open ends provide a suitable draft. It is stated that the grate is large enough to accommodate two ordinary cooking utensils, and that food can be cooked in a short space of time by its use.

SAMPSON STOPPER.

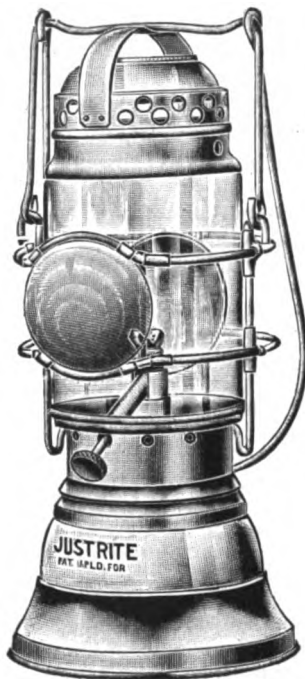
The Sampson Appliance Corporation, 13 East 16th street, New York City, shows a new form of bottle stopper made in varying sizes to fit the ordinary bottle or the larger sizes for a hot water or thermos bottle. The stoppers are made of rubber and are fitted with a threaded bolt and nut, which allow the rubber to be expanded after the stopper is inserted in the bottle, fitting the sides of the opening tightly.



The manufacturer states that the Sampson stopper is having a large sale among tourists, traveling men and campers, and may be used with equally as good results in the sick room and for other household uses. Sampson stoppers are absolutely tight, easily inserted in the neck of the bottle, and as easily removed and used again. The rubber material is the best grade obtainable.

JUSTRITE ACETYLENE LANTERN.

The Justrite Manufacturing Co., 2061-51 Southport avenue, Chicago, Ill., manufactures a complete line of acetylene lanterns for the camper, motorist, hunter, miner, etc. The No. 10 acetylene lantern, shown in the cut, is especially adapted to the motorist, as it is a 20-candle power light, which will burn for five or six hours on three ounces of carbide. It may be used to light the interior of a tent at night, or when repairing the tires of the car, etc. The light given is intensified by a bull's eye lens and reflector and setting the lamp some distance away from the car



provides the repairer with plenty of light for the work. It is made of brass throughout, nickel plated and highly polished. The height of the flame is easily controlled by a small valve, located at the side of the burner.

THE RED-E FOLDING BROILER STOVE.

The Red-E Co., 20 East Broad street, Columbus, O., manufactures the Red-E Folding Broiler Stove and Oven, which offers a combination for the motorist or camper which is ideal. The stove is enclosed on three sides and can be so placed that the smoke from the fire blows away from the operator while in use. Wood is



utilized for fuel and unlike many wood stoves, wood of any length may be burned in it. The oven is attached to the longest closed side by means of hooks at the top, which allow the oven to be removed when it is desired to inspect its contents. The stove and oven are made throughout of sheet metal and will fold into a compact bundle, one inch thick, for packing in the car.

EVINRUDE ROW BOAT AND CANOE ENGINE.

The Evinrude Motor Co., Milwaukee, Wis., manufactures a line of engines adapted to the row boat and canoe that

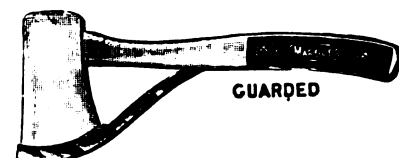


are very popular with campers and tourists. The device is of light weight and can easily be carried in the automobile. A boat can be hired at the camp site, the engine installed in a few moments by slipping it over the gunwale, two hooks being provided for holding it in position.

To adapt the engine to a canoe it can be mounted either inboard or outboard as the owner desires. Suitable fixtures are provided with the engine, by which mounting on a canoe is simplified to a marked degree.

MARBLE'S COAT COMPASS.

The Marble Arms & Manufacturing Co., 267 Delta avenue, Gladstone, Mich., manufactures a Coat Compass and Safety Pocket Axe, which will prove useful to the tourist and camper who travels by automobile. The Coat Compass much resem-



bles a double safety pin and is fastened securely to the coat or vest lapel. The dial is of good size and can be plainly seen.

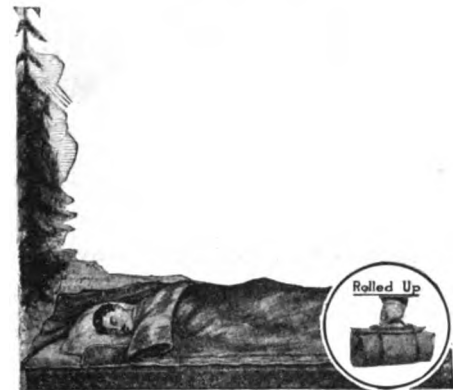
The Safety Pocket Axe will prove an indispensable tool in the woods, as it is light in weight, can be carried in the coat pocket or packed in small space in the



car. The axe will take the place of an axe, hatchet or hammer, and is ideal for setting a tent, blazing a trail or cutting fire wood. The steel used is of the finest grade and will stand rough usage without chipping or breaking.

PERFECTION AIR MATTRESS.

The Atlantic-Pacific Manufacturing Co., 124-128 Atlantic avenue, Brooklyn, N. Y., manufactures a complete line of camp mattresses and sleeping bags for the camper and motorist, known as the Perfection. These articles are made of the best quality of rubber cloth and water



proof Densol cloth, and with ordinary care are guaranteed to give from five to 10 years of service. The mattresses are furnished with covers made of eight-ounce khaki or brown duck. Either article may be folded into a roll and, as they are light in weight, they may be easily carried on the automobile.

HIGH SPEED LENS FOR THE CAMERA.

The Wollensak Optical Co., Rochester, N. Y., manufactures a very complete line of lenses, including Series II Velostigmat



F:4.5, which is an ideal lens for high-speed work for use with the Graflex camera. This lens is also suitable for use on a plate or view camera when equipped with the Optimo high-speed shutter.

For hand cameras the ideal lens is the

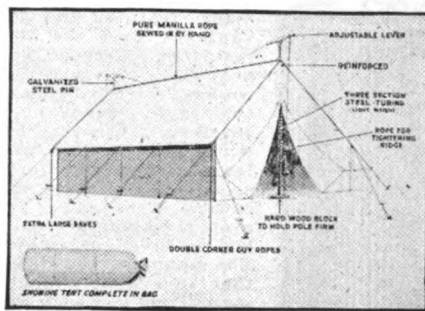


Series IV Velostigmat F:6.3, with Optimo shutter, because it has as much speed as the average hand camera requires and is sufficiently fast as not to be affected by any ordinary motion.

WENZEL POLELESS WALL TENT.

The H. Wenzel Tent & Duck Co., 1035 Paul street, St. Louis, Mo., manufactures a line of wall tents that recommend themselves to automobile tourists from the fact that they are light in weight, fold into a compact bundle that is easily carried on the running board of the car and that no cumbersome poles are required for its erection. A rope woven into the tent at the usual location of the ridge pole takes

its place and is held taut by levers fastened to collapsible steel tubes at the ends of the tent. The sizes vary from seven by

**WENZEL POLELESS TENT**

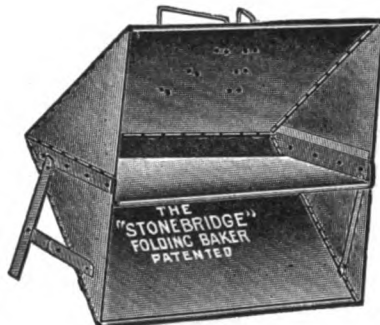
seven feet up to and including 12 by 14 feet with walls $3\frac{1}{2}$ feet high. The material from which the tent is made is light in weight yet, the manufacturer states, is strong and durable. The material is 1.90 shelter tent duck and is claimed to be the finest tent duck made, is closely woven and sheds water like rubber. State Sea Island cotton of the choicest long type is used and it is claimed that it will wear like iron.

STONEBRIDGE FOLDING LANTERN.

C. H. Stonebridge, 23 Warren street, New York City, makes a complete line of camping material, including tents of all

**PATENTED**

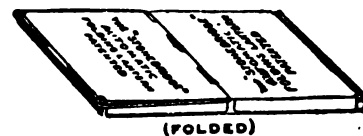
descriptions, folding lanterns and folding bakers. The folding lantern manufactured by this company is the United States



standard field lantern, which is claimed to be storm proof and unbreakable, and will not blow out in a strong wind. When



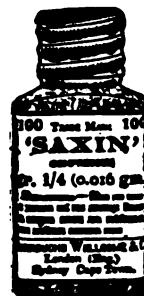
folded the lantern occupies but little space. The folding baker is simple in construction, has no pins to take out, does not make use of a pan, and can be used



for broiling, baking or roasting. For making corn bread or griddle cakes it is claimed to have no equal.

TABLOID TEA AND SAXIN.

Burroughs, Wellcome & Co., 18-20 East 41st street, New York City, are sales agents for Tabloid Tea and Tabloid Saxin, a sweetening agent said to be 600 times



Bottle of 100
actual size

sweeter than sugar. These articles are put up in compact containers for motorists, campers, travellers, etc., and are ready for instant use. Tabloid tea, it is stated, is made from the finest grades of tea, carefully selected pure leaf only.

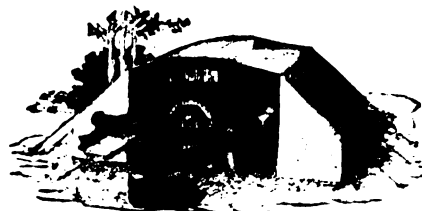
The tea is made by placing the desired number of tablets in a cup and filling it with freshly boiled water. The cup is then



covered with a saucer for a few moments, in order to prevent rapid cooling. Milk and sugar or Saxin, as the case may be, are then added, and the whole stirred. In a few moments, after the leaves have settled to the bottom, the tea is ready for use.

TENTS FOR THE TOURIST.

The Metropolitan Air Goods Co., Athol Mass., manufactures tents of many descriptions that may be adapted for the use of the tourist, camper, ranger or canoeist under the trade name of Utility. These tents are guaranteed to be wind and water proof and usually are equipped



with sleeping bags and pack cloths. The Metropolitan Air Goods products, the manufacturer states, are not new, but have been in use by the public for the past 25 years and have been found entirely dependable.

Other products manufactured include air cushions for all uses, rain coats, camp pads, etc.

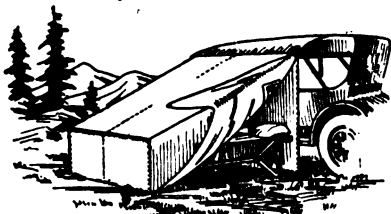


RED SEAL SPARKER.

The Manhattan Electrical Supply Co., Inc., 17 Park place, New York City, manufactures the Red Seal Sparker, which consists of four or more dry cells sealed into a unit, which may be used in various ways by the tourist. It is adapted for small lights in the camp, igniting row boat engines and many other uses where a strong, even battery current is desired.

"RED SEAL" AUTO PORCH BED AND ATTACHMENTS.

The Schaefer Tent & Awning Co., Denver, Col., shows a unique camping unit for the motorist which combines a spring mattress large enough for two with a tent that may be used alone or in con-



nection with the side of the automobile. The tent and mattress are made of high-grade material throughout, and when not in use for touring the mattress may be used in the house as an extra bed or lounge. The outfit folds into small space for carrying on the running board of the car and weighs complete, according to the size, from 65 to 70 pounds.

HAWKEYE BASKET REFRIGERATOR.

The Burlington Basket Co., 1550 Hawkeye building, Burlington, Ia., manufactures the Hawkeye basket refrigerator, an ideal device for the touring motorist. By its use such foods as salads and sandwiches, etc.,



and beverages, are kept crisp and cool and are ready to serve as soon as desired. The basket is made on the principle of a miniature refrigerator and will keep food cool 36 hours at one filling of ice.

LITTLE WONDER OIL STOVES.

The Little Wonder Stove Co., 3538-56 Gable avenue, Detroit, Mich., manufactures

an oil cook stove for campers and for general use that is meeting with a ready sale. The Little Wonder stove possesses many features and advantages over the old-fashioned oil stoves. The heat from the burner is confined to the cooking surface by means of a special fuel saver top, which prevents the heat from going to waste around the top and causes it to enter the oven in a manner similar as in a coal stove. The manufacturer states that the Little Wonder stove, equipped with one burner, will do as much work as an ordinary three-burner oil stove.

Another feature is a specially designed burner which will last for years, as the burner has no wicks or asbestos rings to



renew and the flame cannot be extinguished by a draft. One gallon of oil will last from 16 to 20 hours of continuous burning.

EVER READY ELECTRIC LIGHTS.

The American Ever Ready Works, Long Island City, N. Y., makes electric flash lights for various purposes, including spe-



cial types for the camper, motorist, ranger, hunter, farmer, etc. Camp electric lights are manufactured in the two types shown and may be hung either on a nail



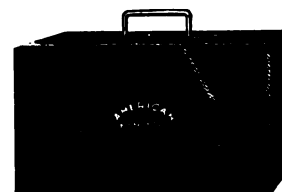
driven into the tent pole or used as a jack light for fishing at night by fastening it to the bow of a boat or canoe. Another type can be carried by hand by a bale handle. This type is very popular with those who do not wish to use a regular



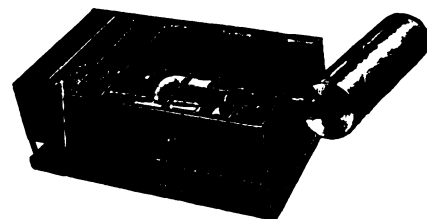
oil lantern after dark. Other types not shown include hand lamps, which may be carried on the seat of the automobile and can be used for picking up signs along the route, etc.

AMERICAN KAMPKOOK STOVE.

The American Gas Machine Co., Inc., Albert Lea, Minn., manufactures the Kampekook stove, which is ideal for the tourist



and camper, as it occupies but little space when packed, may be set up in the open in a few moments, burns ordinary distillate or motor gasoline, and cannot be blown out by the wind. The burner can be turned up or down at will, giving a mild or intense heat as desired. A folding



oven may be included at slight additional cost, which will do all the baking necessary while camping. Other goods manufactured include the American Folding-Handle Fry Pan, the handle of which folds into the pan when not in use, allowing it to be packed in small space.

LUNCH SETS.

The Abercrombie & Fitch Co., Madison avenue and 45th street, New York city, shows a lunch set which is ideal for the tourist. This set is of the suit case style and includes all the necessary articles for



serving six persons. They occupy but little space and can be carried on the running board of the car. The box is constructed of basswood, covered with black enamel duck, finished with nickel plated lock and corner reinforcements.



"There are no arguments against saving what you've got"—

THE war taught us many things, not the least of which was thrift—pertinently termed "saving what you've got." Thrift showed us that last year's shoes could be resoled and that the old suit—with a little mending and pressing—had another year's wear in it.

It showed many cities and towns that the policy of "saving what you've got" could be applied to their road problems. They reasoned this way:

"High costs may offer good arguments for delaying new road construction at this time, but *there are no arguments against saving what you've got.* To neglect the roads already built is waste, and *waste is a crime.*"

If your macadam roads are good, keep them good; if they're in bad shape, *repair them!*

That may mean Tarvia patching and surface treating; the widening of narrow roads by adding Tarvia macadam shoulders, or it may mean utilizing the old macadam as the foundation for a traffic-proof Tarvia top.

Road improvements like these are not makeshift

methods. They are the logical solution of the good roads problem in hundreds of communities today.

Best of all, the cost is low, the maintenance cheap and the satisfaction a blessing to the entire community.

Tarvia roads are mudless, dustless, waterproof and frost-proof. The smooth-running durable surface resists the hardest traffic.

Our engineers will gladly consult with you, without obligation, in solving your road problems with Tarvia.

Special Service Department

This company has a corps of trained engineers and chemists who have given years of study to modern road problems. The advice of these men may be had for the asking by any one interested. If you will write to the nearest office regarding road problems and conditions in your vicinity, the matter will be given prompt attention.

Illustrated booklets of the various Tarvia treatments free on request. Address nearest office.



Gravel road in Bridgeton, Maine, maintained with "Tarvia-B."

Tarvia

Preserves Roads—Prevents Dust

THE BARRETT COMPANY, Limited

New York
Cincinnati
Minneapolis
Atlanta
Lebanon

Chicago
Pittsburgh
Dallas
Duluth
Youngstown
Montreal

Philadelphia
Detroit
Nashville
Salt Lake City
Milwaukee
Toronto

The *Barrett* Company
Toledo Columbus Richmond Latrobe Bethlehem
Winnipeg Vancouver St. John, N.B.

Boston
New Orleans
Syracuse
Bangor
Elizabeth

St. Louis
Birmingham
Seattle
Washington
Buffalo
Halifax, N.S.

Cleveland
Kansas City
Peoria
Johnstown
Baltimore
Sydney, N.S.

(When Writing to Advertisers, Please Mention the Automobile Journal.)

How to Meet Driving Emergencies

NOW that the touring season is here the motorist who drives his own car will do well to accumulate a knowledge of what to do and what not to do in emergencies. As many of the tours taken this summer will probably be through regions more or less hilly and in many cases mountainous, driving in these sections to one who is accustomed to operating his car principally on the level or easy grades, will present many difficulties, especially if this is his first motoring season. Emergencies will be met that will try his nerves and those of the other car occupants if he is not well posted in the handling of the car under the conditions liable to be met with on new roads.

Ascending a Grade.

Hill climbing is perhaps the most trying feat that he will encounter. The conditions to be overcome in each individual case, although similar, vary slightly, so that no set rule will apply for all. Many drivers try to force their

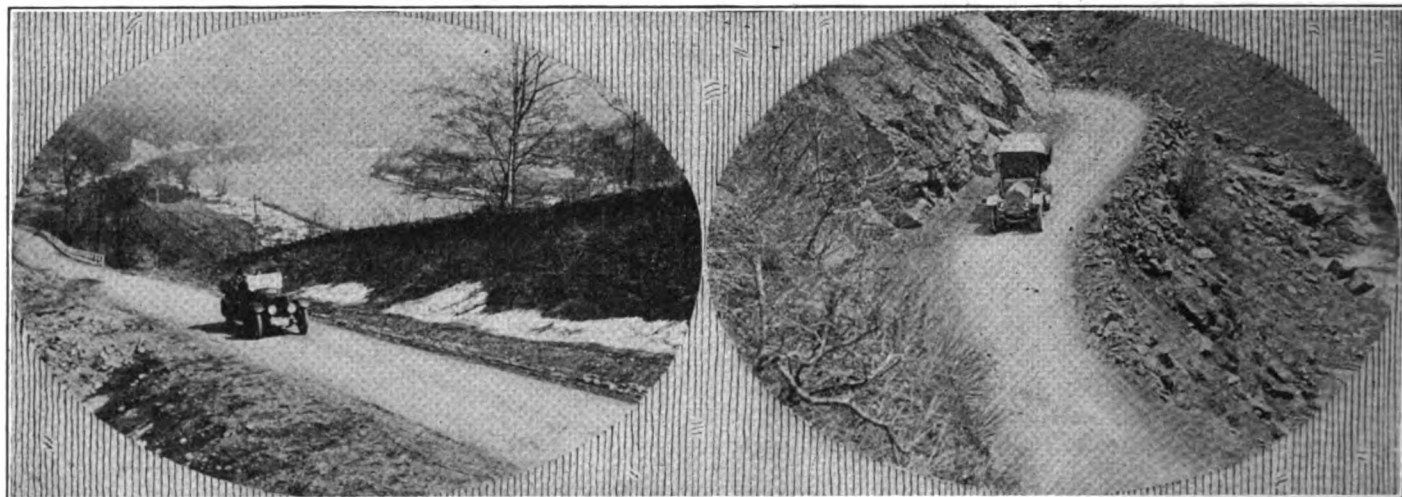
It is better to judge what the car will do while at the bottom of the grade and shift into second, and it will usually be found, unless still stiffer grades are encountered near the top, that the car will take the rise easily without further changes. But if by chance the driver is unfortunate enough to try to take the grade on high, and can only go a part of the way before the engine begins to labor, and finds that he is obliged to shift back into second on the grade, he should do so before the car slows down almost to the stopping point. A car on a grade loses momentum rapidly, and the shift must be made quickly, otherwise the engine will not be able to pick up speed quickly enough and the car will come to a stop. In a case of this kind the driver will be forced to apply the brake and to shift back into first to start the car. Here is where the new motorist is apt to lose his head. Instead of having one of the passengers step out of the car to find a good sized rock and

the engine to heat rapidly on account of the high speed at which it is turning. Changing to the next higher speed will slow down the engine and allow it to cool to better advantage. The wise motorist will do well to stay in second till the top of the grade is reached before shifting into high gear.

Descending a Grade.

When going down the opposite side of the grade, if it is very steep, all the braking power of the car will be needed. Foot and service brake bands wear out quickly in a hilly or mountainous country, and advantage should be taken of other braking sources and the brake bands saved for other purposes.

Many motorists who travel considerably advocate shutting off the ignition when descending a grade, as the action of the piston in the engine cylinders, pushing up against the compression of the cylinders, forms a cushion and acts as a brake if the clutch is left in and the speed change lever shifted to a lower



Left, Car Ascending Grade; Right, Car Descending Long Down Grade.

cars over stiff grades on high gear. This is a mistaken idea. The second speed was put into the gearset of the car for the purpose of easing up on the engine on grades by its use instead of the high gear, thereby multiplying the power of the engine, according to the gear ratio, and allowing the car to take the grade at a slower speed, relieving the engine of undue strain, economizing on gasoline consumption, preventing the engine from knocking and eliminating the heavy strain put upon the crankshaft by the pistons and connecting rods of the engine. Thus the life of the engine will be prolonged and the motorist will get more pleasure from the trip.

Again it is necessary when trying to make a stiff grade on high to rush the car at the bottom of the grade with a fully opened throttle. There is more or less danger in this practise, especially on a strange road. Holes or washouts may be in the track that cannot be seen till the car is almost into them. Quick action on the part of the driver is all that can prevent an accident under these conditions.

fit it behind one of the tires of the rear wheel, he usually tries to hold the car with the brake and stalls the engine before he gets started again. Or else the brakes are allowed to loosen slightly and before the operator is aware the car starts down hill, with the possible chance of an accident before reaching the bottom or coming to a stop at the side.

When caught in this manner with a stalled engine the rear wheel should always be blocked with a stone or some other convenient blocking. This will hold the car while the engine is being cranked and will also give the driver a chance to shift into first speed, and to start without the fear that it will run back down hill or the engine becoming stalled making him nervous.

Starting a car on the first gear in the middle of a bad grade usually will necessitate using that gear clear to the top, unless a chance presents itself, by the road levelling for a short stretch before continuing on up grade, where the driver may shift into second. This should be done if possible, as slow speed causes

speed in the gearset. If the grade is very steep the careful motorist will make this shift at the top of the grade and not wait till he is part way down. He can use his foot or service brake, in connection with the clutch pedal and, when the car seems to be gaining more momentum than he cares to have it, he can check the speed by letting in the clutch and slowing it down through the second speed. On unusually steep grades it may be necessary to use the first speed, and instances have been known where it was necessary to use the reverse speed. It would be a rare instance where this should be necessary but if called upon to use it, the car should be stopped and the gear shifted. It should only be used to bring the car to a stop, as the use of the clutch constantly would cause the car to run in a reverse direction. The first or second speed will probably be all that the motorist will be required to use and either of these may be employed with the engine ignition cut off and the car coasting with the clutch in. Some resistance is offered by the lower gears themselves so that between

them and the braking power of the engine steep down grades can be safely negotiated without much difficulty at a saving of the brake bands on the rear wheels.

On slight down grades the motorist can conserve his gasoline by leaving the gearset in high and coasting with the clutch thrown out, using the service brake to keep the car properly checked. Some even go so far as to shut off the ignition on every down grade and find that they can increase their car mileage by so doing. No time is lost by doing this as the car under good headway will coast to the bottom of the grade, and the ignition can be snapped on before the car loses its momentum to any great extent.

When coasting a grade with the ignition on and the engine running, but with the clutch thrown out, allow the momentum of the car to drop down to about 12 to 15 miles an hour before letting in the clutch, otherwise the speed of the car, which is greater than 12 or 15 miles an hour, will cause the engine to run faster than the throttle will allow it and when the clutch is connected a jerk will be felt in the car.

Wet or Muddy Clay Roads.

If by chance the motorist's travels take him over roads that have been wet by repeated rains, where there is more or less clay, he should follow a very old and infallible rule, keep in the middle of the road and let the natives turn out for him. They know the nature of the soil and he does not. On clay roads especially is this rule worth following as by their very nature they are treacherous for motorists. Even in its dry state clay is slippery. Drive in the ruts and do not mind the bumps or holes in them but when going through these holes throw out the clutch for the moment, so that the passengers in the tonneau may ride with what comfort is possible.

Never travel with one wheel in the tow path and the other on the outside of the rut, for the outside wheel will slip sideways at times, even though the tire may be a new non-skid type. When this clay formation is wet the chance of slipping is multiplied. So that the only safe course is to follow the ruts as mentioned. A slideslip is very liable to land the car in the ditch and possibly cause injury to the occupants.

Speeding Dangerous.

The tourist who speeds either on a grade or on the level is not only a menace to himself, but also to other motorists whom he meets on the road. By "touring" is meant "traveling in a leisurely manner from place to place." This does not mean rushing at top speed, but at an average speed of say 25 miles an hour, thus giving occupants of the car a chance to enjoy the beauties of nature.

On tours covering several days or weeks one will find that his car will show a surprising saving on gasoline if the carburetor is set very close to a lean mixture and the speed is kept down around 25 miles an hour. Many times one hears a motorist tell how he made a tour of so many miles on so much gasoline, the statement seeming unbelievable but, by following the few simple rules

that every motorist should know, almost any operator can duplicate performances of this kind.

Coasting down grade with the ignition shut off and the throttle closed; traveling at an average speed of 25 miles an hour; adjusting the carburetor to a nearly lean mixture; carrying the spark fully advanced, whenever possible, thus keeping the cooling system working properly and the engine cool; making sure that both sets of brakes are working properly; using one's head in emergencies. These simple rules will, if followed, make a touring trip a pleasure to be long remembered.

Motorists Making Own Repairs

Excessive charges for small and simple repairs at automobile service stations, or repair shops, have done more than any other one thing to stimulate the average owner of an automobile to learn the construction of his car and undertake to do the less difficult repairing himself, according to an enthusiastic motorist who has been able thus to reduce the expense of keeping a car. Especially in suburban communities is it a common thing to see owners doing work on their cars which formerly they were accustomed to send to the repair shop to be done.

"The first year I had a car," said a suburban car owner, "I had an idea that the only place where it could be properly repaired was at a service station. The first time I took my car there was to have the carbon removed and the valves ground. When I enumerated the things that I wanted done and asked for an estimate of the cost, which I knew was usually about \$8 for a four-cylinder car at most garages, I was told that it was not possible to set any definite figure. In addition, it might be possible that some of the valve stems were bent and these would make for additional cost.

"However, when I insisted that I did not want to have the repairs made without knowing more definitely what the job would cost, I was informed that the charges would be something like \$9 or \$10. With that understanding the car was left for carbon removal and valve grinding, and the resultant expense was \$9.95, which included the cost of a new gasket at 95 cents.

"The next time I desired to have the carbon removed I went back to the same service station, but failed to take the precaution of getting an estimate on the work, thinking it would be about the same. When the bill was presented it amounted to \$18, and the largest item in it was for labor at \$1 per hour. This experience showed me the necessity for undertaking to do the work myself, and the next time that it became necessary to remove the carbon and grind the valves I got a few pointers from one of the skilled mechanics at the garage where I kept the car. I was a little slow with the first undertaking, but I was able to take the engine apart, clean it, and assemble the parts again within six

hours, and I was also able to use the old gasket, which was still in good condition after the second time the carbon was removed.

"In all my experience in removing carbon, I have yet to find a valve stem that needed replacement, and I have driven my car nearly 10,000 miles. I figure that, even granting that the service station pays its mechanics \$1 an hour, an \$8 charge for the job is a fair one.

"On another occasion I had taken my car to a service station to have a repair made so as to stop grease and oil leaking into the brake drum. When I got the itemized bill it included charges not alone for this specified repair, but for new felt washers, readjustment of foot and emergency brakes, and other things I had not ordered.

An Inexperienced Workman.

"Apparently an inexperienced workman had done the job and before I drove the car home, a distance of 15 miles, the grease was leaking into the drum again, and I had to take the car back to the service station several times before the defect was remedied. The trouble was found to have been caused by putting too much lubricant into the differential housing.

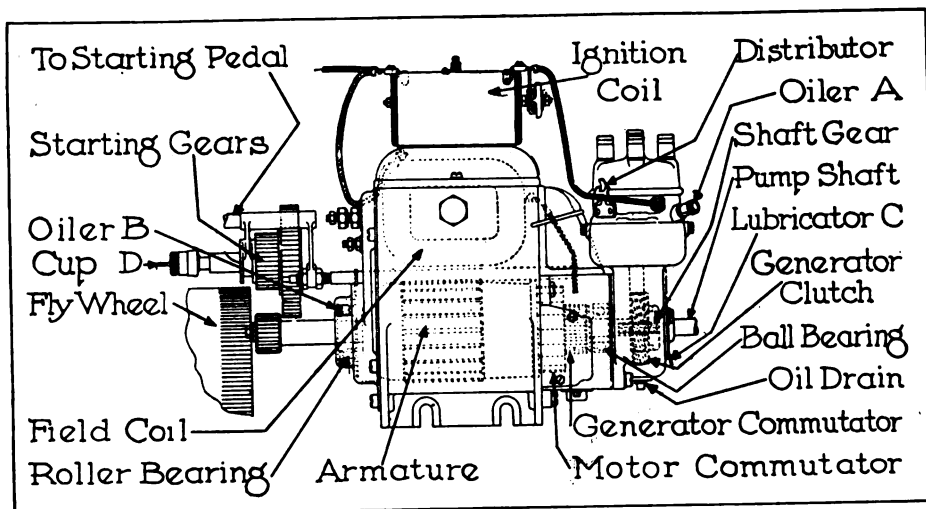
"Encouraged by success in making these first repairs, I finally got up the courage to explore other parts of the car and I not only found that I could keep the different mechanisms in good running order, but I believe I take somewhat more care in doing these jobs than the average green mechanic that had done previous repair work on the same automobile. In addition, I have always found a great deal of pleasure in learning all about the construction of the car, and the knowledge so acquired has stood me in good stead when for one cause or another I have needed to make repairs on the road."

This owner estimated that the repairs on his car during the first year cost him from \$75 to \$100. During the present year his total repair bill has been under \$1, and this included 15 cents for a foot brake cam support, which he replaced when the part was snapped off by an obstacle bouncing up from the road bed, and the terminal for the storage battery. He claims that the average motorist can save himself unnecessary repair bills if he will take an interest in his car and learn how to do the simple things that must be done from time to time to keep the car in good condition.

TO CUT GLASS WITHOUT A DIAMOND.

Many times it is necessary to cut a large pane of glass and one is not always provided with a diamond for doing this work. In this case lay the glass on a straight, flat surface; make a mark on the glass at either end, where you wish to cut the glass. Heat a piece of wide thin iron, perfectly straight or in a curve if desired, and place it on the glass at the marks made. The heated iron will cause the glass to expand on the upper surface sufficiently to crack the glass on the heated part, the crack extending clear through.

Tuning Up the Electrical System and Adjusting the Carburetor



Delco Single-Unit, Starting Motor and Generator: Components Clearly Indicated.

BEFORE starting on the tour the generator and starting motor may require some attention but, as average motorists would rather trust these units to experts, it would be wise to pass them for a time and later, after the other units of the car have received attention, take the car to a service station and have the necessary work done. This will consist of cleaning the commutator of the generator and starting motor, fitting new brushes if those in use are badly worn, under-cutting the mica between the copper segments of the commutator, setting the third brush on the generator and otherwise putting the generator, starting motor and regulator in shape for the season. The storage battery should receive attention at this time and should be tested for its charge. If below 1200 it needs recharging and should be removed from the car and recharged from the service station's charging generator or rectifier. If above 1200 and around 1280 to 1300, the battery is fully charged and in good working condition. Testing by the repairer will determine whether other work besides recharging will be necessary and attention can be given accordingly.

Distributor and Breaker Points.

The distributor and breaker points should be cleaned and the points set properly, as the proper operation of these units will determine, to a great extent, the proper operation of the engine. The breaker points, after a period of use, will become pitted, or the points will burn, possibly through the condenser being punctured. Continued use of breaker points under these conditions will cause arcing between the points which will rapidly increase the distance between them until a condition is reached where the engine runs irregularly. Removing the condenser, and testing its efficiency will determine whether it is short-circuited or not. If punctured or short-circuited a new condenser is necessary, as its

duty is to care for the excess current in the ignition circuit, by absorbing it at the time of the points breaking, thus preventing them from arcing. Breaker points that are badly burned will require dressing with a fine file, care being taken to remove only what metal is necessary to square up the points and make a good, firm contact. The points should then be adjusted, using the small wrench for this purpose found in the tool kit, fitted with a gauge which gives the proper clearance for the points when open. This will vary with different systems of ignition units, but the average distance is about .020 of an inch.

All lint and dirt should be removed from the interior of the distributor case as well as from around the points of the breaker. The ball bearing, fitted around the shaft under the breaker cam will require a few drops of oil. After the breaker points have been adjusted, the lock nut which holds the set screw should be tightened to prevent the screw from loosening.

The Delco system of ignition is timed as follows: Place the spark lever on the steering wheel in the fully retarded position. Turn the engine to the seven degree mark (which is approximately one inch after dead center), with the No. 1 cylinder on the firing stroke. Loosen the timing adjustment screw in the center of the distributor shaft and turn the breaker cam so that the rotor button will be in the position under the No. 1 high-tension terminal when the distributor head is properly located. This determines the proper lobe of the cam to time by. The cam should be very carefully located so that when the slack in the distributor gears is rocked forward the contacts will be

opened by the cam, and when the slack is rocked backwards the contacts will just close.

Tighten the adjustment screw securely, replace the rotor and distributor head with the head properly located by the tongue in the hold-down clip.

Manifold Fittings.

Test all manifold fittings, especially of the intake manifold, for loose leaking connections, with engine oil squirted from a can around the fitting while the engine is operating, to note if the oil is drawn in by the engine. If air leaks show tighten the joints or supply new packing as leaks at this point will cause the engine to take in more air than is required, causing it to run irregularly. Test spark plugs, valve plugs and separable head in the same manner. The indication of a leak will be shown by air bubbles working up through the oil, showing loss of compression. Tighten the plugs, caps, head bolts, etc., till leaks disappear.

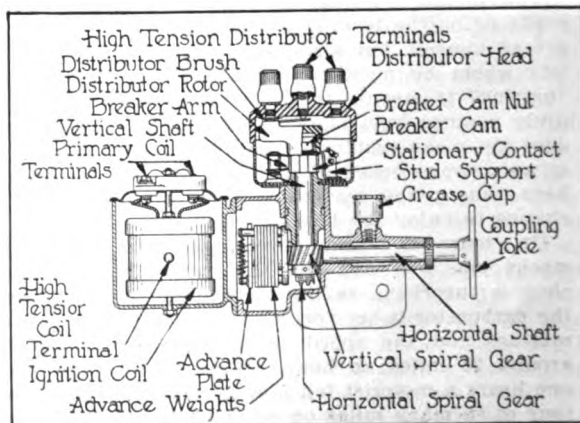
Adjusting Carburetor.

It is rather difficult to give authentic directions for setting carburetors that will apply to all makes as those given by the manufacturers of each differ. However, it is safe to say that if the car has been running perfectly the present setting of the carburetor giving good mileage, the best plan is to leave it alone, as it will probably continue to give the same results, unless you happen to be traveling in a mountainous country where the air is much rarer than at lower levels. This may be compensated by opening the needle valve slightly, or pulling out the choker rod on the dash, giving the engine a richer mixture on which to operate.

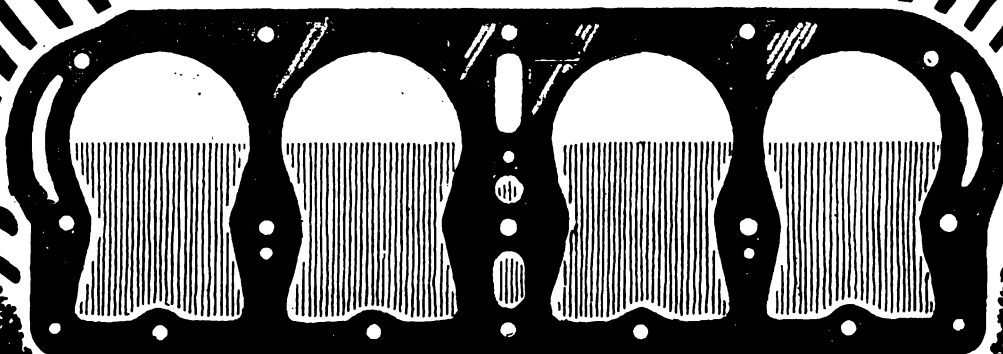
Where a carburetor has been functioning unsatisfactorily the motorist will do well to either adjust it before starting or else take the car to a competent carburetor repairer and have him do it. Work that the motorist can do is cleaning the fuel pipes and screens.

Gravity Feed.

If gravity feed is used there is one screen and occasionally two between the



Northeast Distributor, Showing Automatic Spark Advance, and Points Requiring Lubrication.



NEVER-LEAK

CYLINDER HEAD GASKETS

STRONGEST WHERE OTHERS ARE WEAKEST

Most car owners know from experience that a gasket that will not crack, break or blowout is better than a good gasket.

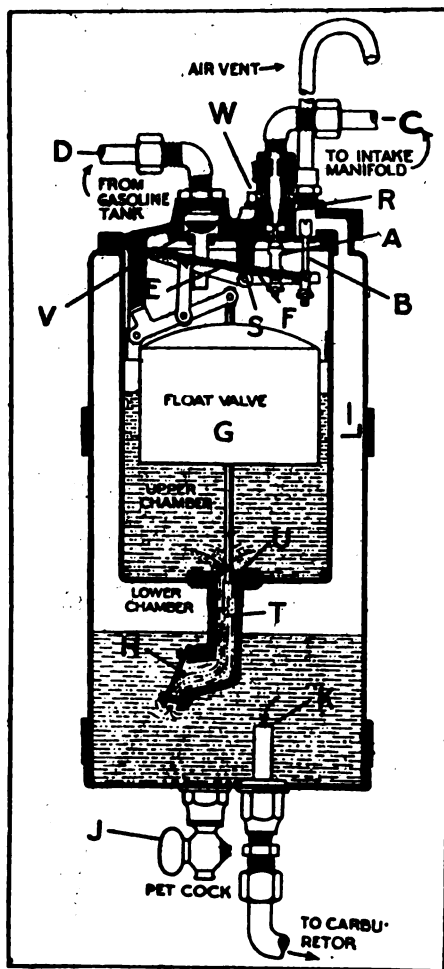
None of these defects can develop with NEVER-LEAK Gaskets. Old type gaskets may cost slightly less, but you cannot afford to gamble with car service and repair bills for a few cents.

NEVER-LEAK Gaskets are metal enclosing asbestos fabric—the only type made with seamed edges, that strengthen and reinforce it 100 per cent. Every one guaranteed. We are the world's largest gasket maker. Our standard stock includes gaskets for nearly 100 cars and trucks. We produce any type to specification.

We can fill any stock order immediately. We can make delivery to schedule.

Write for Catalogue, Quotations and Discounts.

FITZGERALD MANUFACTURING CO.
TORRINGTON, CONNECTICUT



Stewart Vacuum System, Indicating Components of Tank.

main tank and carburetor. One is located under the tank at the side of the sediment well and screens the gasoline before it enters the fuel pipe. Loosening the nut that fastens the pipe to the tank connection allows the pipe to be removed and the screen is taken out by loosening the connection, turning it off from the well. The screen can be cleaned by blowing through it or by washing in gasoline, brushing off the accumulation of dust and rust that has collected. A second screen is sometimes located where the fuel pipe is fastened to the carburetor. This is removable and the screen comes out with it and can be cleaned in a similar manner.

Vacuum Feed.

The vacuum feed system employs a screen at the top of the vacuum tank, which prevents the entrance of foreign substances into the tank. This screen is located just under the fuel pipe connection from the main tank and is removed by uncoupling the fuel pipe, unscrewing the connection. Washing the screen and possibly brushing it will remove the foreign substances and allow a free flow of gasoline. Some trouble is sometimes experienced by motorists in deciding when this particular screen is clogged. Indications are, however, given early so that an experienced motorist usually recognizes what is the cause. Trouble will develop when ascending a hill, regardless of the amount of gas fed to the engine, causing it to lag. This is especially no-

ticeable if heretofore the engine had been taking the same grades with ease. Running on the level the trouble is not so noticeable unless speed is wanted, when the engine apparently lags. The reason for this is that the clogged screen prevents the engine from getting sufficient gasoline. Cleaning the screen remedies the trouble. Fuel pipes may become clogged, although this is unusual. If screens are clear and the engine still lags, possibly the fuel pipes are clogged and they should be disconnected, air blown through them or a wire run through, forcing out any obstruction. A sharp bend in the pipe will cut down the flow of gasoline. Examine the pipe from end to end for these bends and if found straighten them.

PROPER CARE OF MODERN IGNITION.

Every automobile owner is vitally interested in the ignition system. He wants to know not only how it is constructed, how it operates and how to care for it, but also the fundamental advantages of certain systems. For some years past in America the battery ignition system as opposed to the magneto has been discussed and more recently this all important topic has also been considered in Europe. The fundamentals of both systems will first be discussed here and the advantages of the two types taken up more in detail later on.

An automobile engine is fired by a spark. This means that a mixture of gasoline and air drawn into the cylinder is exploded by means of electricity generated by a magneto or storage battery and then passed to the spark plug. Both systems provide a source of electrical current, which at its actual generation is on low voltage (pressure) and must be transformed into one of higher voltage sufficient to cause it to jump the gap in the spark plug. It is an electrical phenomenon that when one coil of few turns of heavy wire carrying low-tension current is surrounded by another coil of many turns of fine wire, any interruption of the low-tension circuit produces by so-called inductance a high-tension current in the coil of fine wire. The coil of heavy wire is called the primary, the fine wire the secondary winding. The interrupter or breaker points are in the primary circuit, so the owner can readily see why it is necessary to have the points properly adjusted, for if they are not the ignition "timing" will not be right owing to the high-tension current being produced at the wrong time, either too late or too early. The high-tension current produced in the secondary coil is led to a so-called distributor arm, which in turn passes it to cables which lead to the spark plugs. These plugs, being grounded in the cylinders and one end of each coil being grounded, the electrical circuits are complete. Both systems have a condenser in the primary circuit for preventing arcing at the breaker points and also for building up a current which is discharged when the breaker operates.

Units of Battery System.

In the battery system the units are a battery, a coil and a timer distributor.

This latter unit contains the breaker points and the necessary wires to connect these units are included. The weakness of the battery system lies in the battery itself, for if this should become too weak or fail altogether, the engine will not run. The owner, in making tests of a battery equipped engine can try each component separately to determine where the trouble lies. It is usual to start at the plug ends. Lay the plugs with the cables attached on the cylinder head and crank the engine. If good sparks occur at the gaps this proves that the ignition is not at fault. Often, however, while sparks will appear, they will be too weak to ignite the mixture under compression. If the plugs do not show sparks then the cables should be followed through to the timer distributor. With the switch in one position, move the breaker points and note if there is slight arcing. If so it indicates that there the current is all right at the points, but that the trouble is beyond, perhaps in the distributor arm or the contacts. If there is no arcing at the points then one must search further and inspect the wiring and the battery. Usually it is the latter which perhaps has been weakened by too frequent use of the starter or lights, or both. Often, however, the trouble is in some one of the many wires connecting the units and in order to discover which one it is, it is necessary to trace the circuits separately.

Why Batteries Are Used.

The use of the battery system for passenger cars has come about through the desire on the part of car manufacturers for keeping down expense in building, and also because of the convenience of having all the electrical requirements of the car supplied from one source. In doing this, however, reliability has been sacrificed, as engine operation is dependent upon a comparatively weak unit.

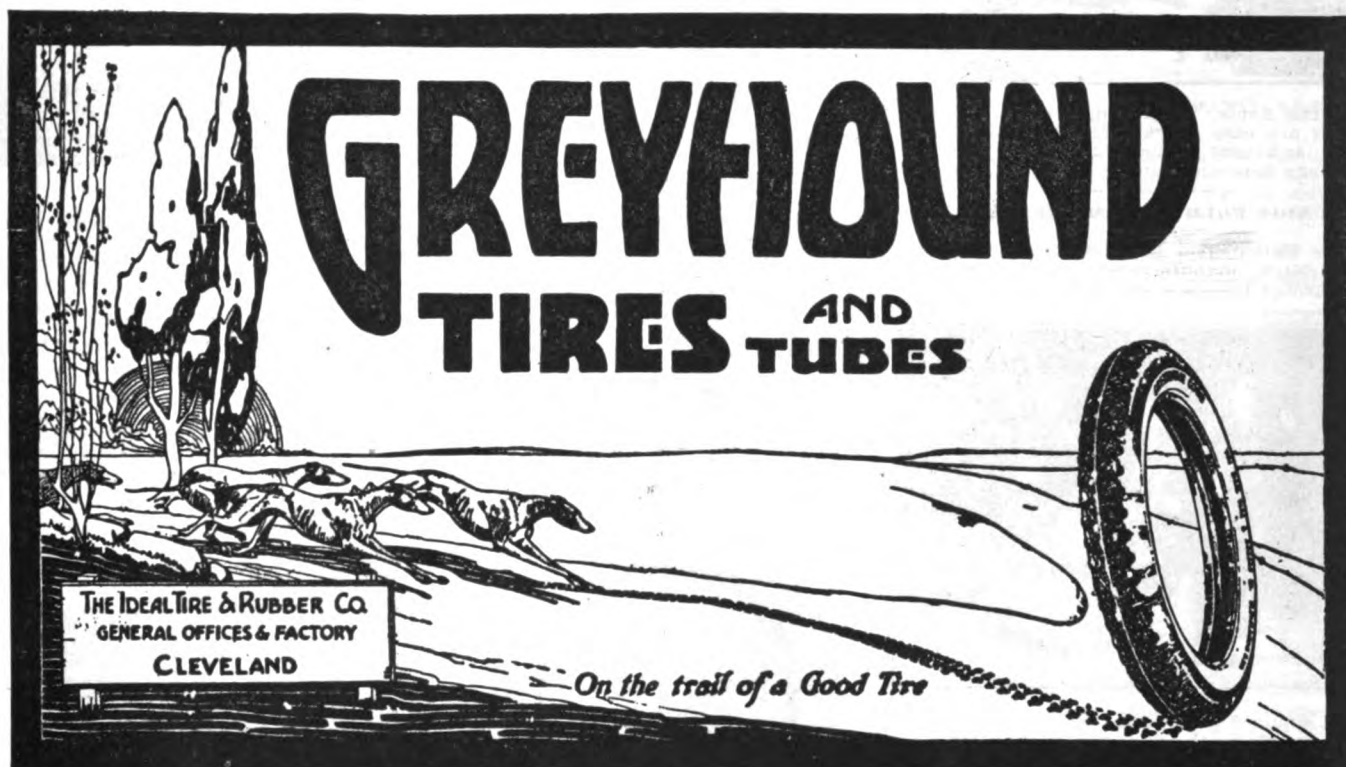
Tractor and truck makers, as well as the designers of most high priced cars, recognize the superiority of the magneto, and in Europe, especially, the use of this form of ignition is fast becoming well nigh universal.

DASH GASOLINE GAUGE TELLS CONTENTS OF TANK.

Engineers have just developed and will soon market two unusual devices, one an electric gasoline gauge that registers accurately on the dash and in the rear of the car the amount of gasoline in the tank and the other a hot water heater that eliminates the necessity of using anti-freeze solutions or withdrawing the water on cold nights.

An important feature of the gasoline gauge is in checking the purchase of gasoline. One may sit behind the wheel while the tank is being filled and the dash gauge will indicate accurately how much gasoline has been put into the tank.

The hot water heater is automatic so that an owner may drive his car into a cold garage, shut off the engine and go away certain that when he wants to use the car again the engine will be warm.



GREYHOUND
TIRES AND TUBES

THE IDEAL TIRE & RUBBER CO.
GENERAL OFFICES & FACTORY
CLEVELAND

On the trail of a Good Tire

The illustration depicts a greyhound dog running across a landscape, leaving a trail of tire tracks behind it. On the left, there are stylized trees and a sign for 'THE IDEAL TIRE & RUBBER CO. GENERAL OFFICES & FACTORY CLEVELAND'. On the right, a large, detailed tire is shown. The title 'GREYHOUND TIRES AND TUBES' is prominently displayed in the upper center.

ANGLE LAMPS FOR CAMP.

The Angle Manufacturing Co., 110 West 40 street, New York city, manufactures the Angle Lamp, which is especially suited for campers in that kerosene is used for fuel, and is said to give an unusually bright light for reading or other purposes. Angle lamps are constructed of brass throughout, use but little oil and give an intense white light, without shadows be-



low the flame. It is claimed that these lights are easy to care for, burn without noise and can be lighted similar to the ordinary kerosene lamp.

UNION FOLDING CAMP GRATES.

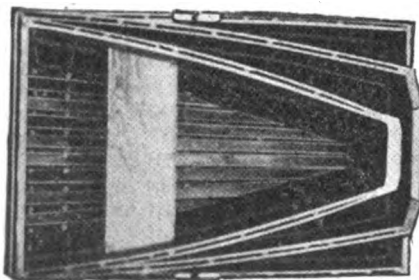
The Union Steel Products Co., Ltd., Albion, Mich., manufactures a line of camp fire grates that are stated to be a neces-



sity, summer or winter, for the motorist who spends much of his time out of doors. The grate shown is known as Style M and is made of steel wires, folds into a small package when not in use and occupies but little space in the car.

SECTIONAL STEEL BOAT.

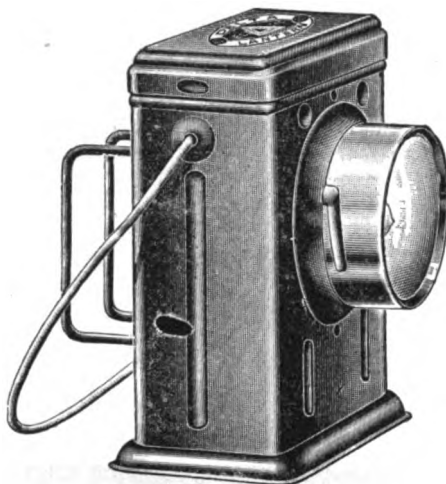
The F. H. Darrow Steel Boat Co., Albion, Mich., manufactures a steel boat that appeals to tourists from the fact that it can be taken apart in sections and trans-



ported on the side of the car to whatever location the motorist chooses to camp. The boat is made throughout of steel and can be equipped with a small gasoline motor which converts it into a small power launch at small expense.

DELTA ELECTRIC LANTERNS.

The Delta Electric Co., Marion, Ind., shows a unique electric lantern for the camper, hunter, etc., that meets every re-



quirement. The lantern is designed for hand use and is provided with a bale handle for carrying. The source of current supply consists of two dry cells, connected to the bulb in front, which is capable of throwing a beam of white light over 100 feet. A flanged base prevents the light from tipping over when placed on the ground or other flat surface.

TAYLOR COMPASS.

The Taylor Instrument Companies, Rochester, N. Y., manufactures a compass for motorists and others who lead an outdoor life that is especially adapted for the



work. The instrument is stated to be very accurate, is of a size suitable to be carried in the vest pocket, and is graduated in degrees plainly marked in such a manner that they are easily read.

THE AUTOPACK.

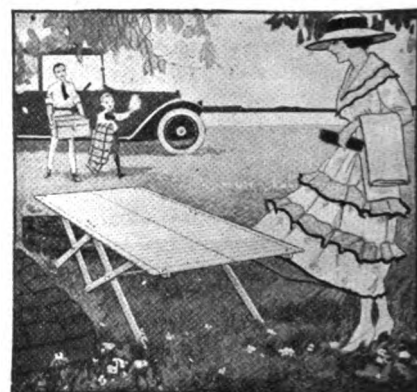
A. J. Peterson, 15 Phoenix building, Duluth, Minn., manufactures the Autopack for tourists, which, it is stated, fills a long



felt want. There are many small articles which the motorist wishes to include in the outfit for which there is usually little or no room. The Autopack fastens to the side of the car body, the bottom resting on the running board, and is of sufficient size to carry much of the luggage usually carried in suit cases. It is made of heavy water proof auto top cloth and in two styles, one for the Ford or cars of similar size, and the other for cars of larger size.

OUTING LUNCH TABLE.

The Puffer Hubbard Manufacturing Co., Minneapolis, Minn., manufactures a table



for the motorist that is used to advantage when camping or on outing trips. The device is light in weight, occupies but little space on the automobile when folded, is built strongly and will last for many years.

EASTMAN KODAK NO. 1-A.

The Eastman Kodak Co., Rochester, N. Y., manufacturer of the famous Eastman Kodaks, is showing the No. 1-A Auto-graphic Special Kodak which is recommended to motorists for taking pictures while touring. The 1-A is equipped with



the Kodak range finder, anastigmat lens f.6.3 and Optimo shutter or, for an additional price one may have a Bausch & Lomb No. 2 Kodak anastigmat f.6.3 lens, with a 5 1/4-inch focus. For high speed, or accurate work, it is stated that this outfit is unexcelled.

UMBRELLA CAMP STOVE.

The Umbrella Camp Stove Co., Mount Vernon, Wash., manufactures a unique device for the camper which is well named the "Umbrella Camp Stove." This device is constructed in the form of a four-legged standard, three at the side and one in the center, hinged at the top.

TRADE OUTLET

HOTEL EMPIRE

Broadway at 63rd Street
NEW YORK CITY
"The Hotel of Easy Access"

Room, use of bath \$1.50

Parlor, bedroom
and bath, **\$3.00**

Add to the above rates, 50c. for each
additional person.

All Subway,
Elevated, Surface and Bus Lines
lead right to the door.

Beautiful Central Park—1 block.

OUR RESTAURANT
is noted for its excellent food and
moderate prices

P. V. LAND - Manager

Centrally
Located

Near all the Famous
Shops and Theatres



Send it to Detroit

MAGNETOS.

Bosch DU4 Variable spark.....	\$30.00
Bosch DU-4 set spark.....	25.00
Bosch D4 and Dr4.....	25.00
Bosch D6 and Dr6.....	30.00
Splitdorf 4 cyl. Dixie, high tension	25.00
Splitdorf 4 cyl., Models A, T, X and D.....	10.00
National 4 cyl. low tension.....	8.00
Briggs 4 cyl. low tension.....	8.00
Remy 4 cyl., type R L.....	15.00
Simms SU4 high tension.....	22.00

GENERATORS.

Deaco 6 volt.....	\$12.00
Auto Lite 6 volt.....	15.00

COILS.

Splitdorf T S type.....	\$10.00
Splitdorf box type.....	6.00
Bosch type A.....	10.00
Remy box coils.....	6.00
Remy type LC and LE.....	8.00
Briggs box coils.....	6.00

DETROIT MAGNETO REPAIRS ARE BETTER.

WE REPAIR any make magneto, coil, lighting generator or starter and give 24 hours service. Member Detroit Automobile Trade Association.

Detroit Magneto Exchange

192 Grand River Ave. Detroit, Mich.

Magneto and Generator Exchange of N. E.

44 COLUMBUS AVENUE, BOSTON, MASS.

SAVE 50%

Offers——

Quality Service for your car.

Starting, Lighting, Ignition.

One year guarantee on repairs and installations of all makes.

Everything pertaining to Auto, Electricity, Magneto and Generator Parts. We have one of the best equipped shops in New England devoted exclusively to this work.

**BOSCH, SPLITDORF, EISEMANN, DIXIE, BERLING MAGNETOS
and Parts Always in Stock.**



AUTO SAVE 50-90% FOR 400 CARS PARTS

POPE, PACKARDS, PIERCE, BUICK,
STEVENS-DURYEA, KNOX, OVER-
LAND, ETC.

Motors, \$25.00 up	Presto Tanks, \$4.50 up
Magnetos, 4.00 up	New Spotlights, 1.00 up
Carburetors, 3.00 up	Generators, 10.00 up
Rear Axles, 15.00 up	Gears, 1.00 up
Front Axles, 5.00 up	Bearings, 1.00 up
Cylinders, 5.00 up	Radiators, 10.00 up

\$12 Diamond Bumpers..... \$5.50

Jobbers in Bankrupt Auto Supplies.

BRIGHTMAN AUTO EXCHANGE

321 Windsor Ave., Hartford, Conn.

Every Ford owner should read "Transforming the Ford." Tells how to secure smooth, positive brake action that no car can excel. A little "transforming" and your car will glide to a quick, quiet stop without the annoying, irritating clatter that you now experience. It will go into low or reverse without jumping or jerking, and you can pick up speed with all the smoothness and ease of a high-priced car. All accomplished without additional expense and the result is a clear saving of 75 per cent. in one direction alone. "Transforming the Ford" tells how it's done. Send for your copy this very minute. 10c stamps or coin. CORMACK CO., Dept. 57, 500 Fifth Ave., New York City.

SPEED OR POWER FOR THE FORD.

Install a set of:

- 2 1/2 — 1 Gears in the Racy Type
 - 3 — 1 Gears in the Roadster
 - 4 — 1 Gears in the Delivery
- Our Trade Mark—A star on every gear insures quality.

DETROIT RADIATOR & SPECIALTY CO., 268 Woodward Ave., Detroit, Mich.

AUTO-TOP AND SEAT COVERS

\$7 up—parcel post prepaid. Easy to apply. Catalogue and samples free. Auto Equipment Co., 16 Canal, Cincinnati, O.

COTTON WASTE, WIPING RAGS, CHEESECLOTH.

Adapted for automobile use, in 1/2 lb. and 1 lb. cotton bags and paper cartons.

**SOFT, CLEAN, WHITE COTTON
WASTE.**

Assorted wiping rags—New, clean sanitary. Sample on request.

STANDARD WASTE & RAG CO.
558 W. 51st St. N. Y. C.

AUTO PARTS.

50% to 90% OF List.

24 Hour Service. Unlimited Stock.

Pope-Hartford, Columbia, Reo,
Overland and 200 other makes.

Motors, \$20.00 up	E. Presto Tanks, \$4.00
Magnetos, \$3.50 up	B. Presto Tanks, \$4.75
Cylinders, \$3.00 up	Bearings, 50c up
Springs, \$1.00 up	Rims, \$1.00 up

1000 Other PARTS Bargains.

If you want any part not listed here.

Write Us—We Have It.

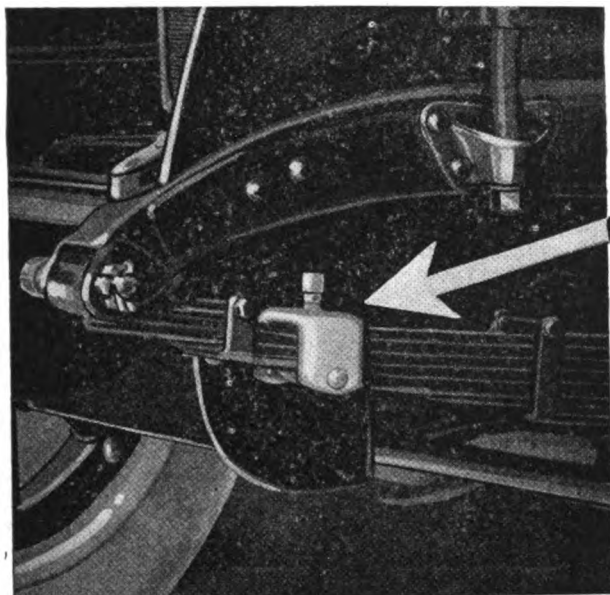
Conn. Auto Parts Co., Inc.

18-20 Morgan St., Hartford, Conn.

Send \$1.00 for a can of Lubricant Carbon Remover. Keeps motors clean, that gasoline may produce power more freely. No-Water Hand Cleaner 25c per tube. For other accessories write John Seidl, Fullerton, Md.

(When Writing to Advertisers, Please Mention the Automobile Journal.)

Nobody admires a squeaky car



You can keep your car running sweetly and quietly by equipping it with Brown Oilers.

They feed in oil and keep the working surfaces of the spring leaves clean and smooth.

\$10.00 for a set of 8 Oilers.

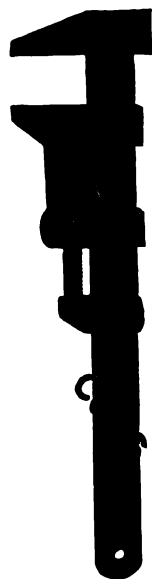
Guaranteed to work to your satisfaction.

BROWN SPRING OILER CO.

6913 Carnegie Avenue

Cleveland, Ohio

COES *The Standard* WRENCH



WRENCHES that are made for the hardest service. They do not break but grip and hold and their efficiency never lessens.

Economy tools as they last longer, give better service and never become useless through wear.

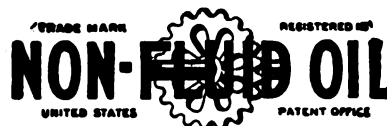
Utility wrenches of the highest order for car owners and repairers as they can be used in compact places and once set hold like a vise.

*The Best Wrench
The Cheapest*

All dealers carry in stock the exact size to meet your need. They recommend Coes Wrenches as all good dealers have for more than fifty years.

COES WRENCH COMPANY
WORCESTER, MASS.

Insure a pleasant trip with



WEEK end trips with long mileage are made pleasanter when gears and bearings can be packed with NON-FLUID-OIL and forgotten. It won't melt like grease or leak out like oil. NON-FLUID-OIL will protect all frictional parts from wear; won't leak out and far outlasts greases or gear oils.

New York & New Jersey Lubricant Co.
401 BROADWAY, NEW YORK



K-00 SPECIAL
grade for gears

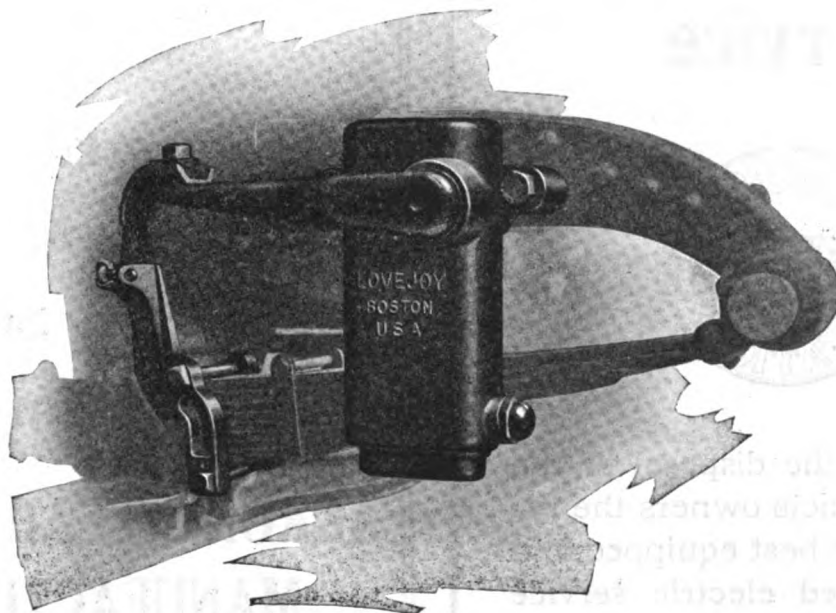
K-000 for
all bearings

*At your dealers'
in Orange Cans*

(When Writing to Advertisers, Please Mention the Automobile Journal.)

LOVEJOY SHOCK ABSORBER

Guaranteed for the life of the Car



708 Beacon St.

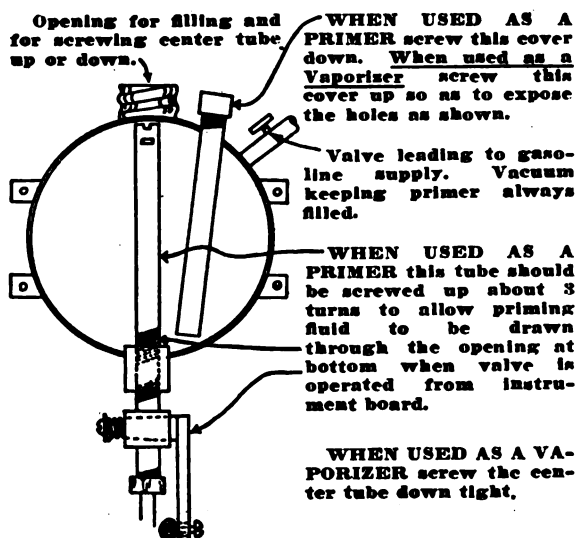
LOVEJOY MFG. CO.

Boston, Mass.

"ECK" Vapor and Primer For Cars, Trucks and Tractors

A wonderfully efficient device, easily installed and controlled from the instrument board, instantly convertible to vaporizer or primer, that greatly economizes fuel, reduces carbon and insures starting in any temperature.

AUTOMATIC PRIMER & VAPORIZER



An all-season necessity that sells at sight, that means big profits to live dealers and garage men.

List Price, \$7.00. Liberal discounts. Send for sales proposition today.

"ECK" VAPOR & PRIMER CO.,

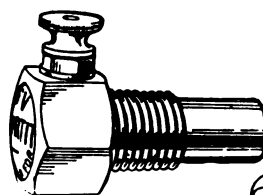
Rochester

108 Oxford St.

New York

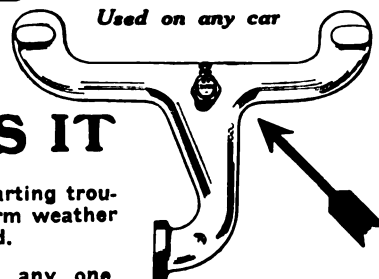
STARTIT Manifold Electric

Heater and Vaporizer



Pat. Apd. For

Used on any car



STARTS IT

Your cold weather starting troubles are over, your warm weather efficiency is increased.

Can be installed by any one. Absolutely GUARANTEED to give satisfaction.

Big money for DISTRIBUTORS and DEALERS. Write for details and trade discount.

List Price \$3.00

If your dealer cannot supply you write us direct.

THE STARTIT MFG. COMPANY

1523-29 E. Washington St. Indianapolis, Ind. U.S.A.

The Startit Company, 521 South Wabash Ave., Chicago, Ill.
Distributor for
Indiana, Illinois, Wisconsin and Minnesota.

(When Writing to Advertisers, Please Mention the Automobile Journal.)

Electric Repair Service



We place at the disposal of the trade and vehicle owners the resources of the best equipped and largest stocked electric service station in the east.

We are specialists in vehicle service and all our workers are experts.

The best facilities obtainable, with an organization qualified to undertake any work, and complete it quickly and accurately, means time and cost economy and entire satisfaction for owners wherever located in New England.

Personal attention is given all work, and restoration and conversion of electrical equipment of any type or make is guaranteed to be satisfactory.

Let us do your electrical work. Let us submit estimates. All stock used is the highest quality, backed by a guarantee.

Official Service and Parts Representative for
AUTO-LITE LIGHTING AND START-
ING SYSTEMS.

Genuine Parts Only Are Used

William H. Flaherty Co.

74 Cummington St.,

Boston, Mass.

Wonderful Values In Tires

Factory Blemished
and
Surplus Stocks
from

**AKRON'S LEADING TIRE
MANUFACTURERS**

Any Akron Bank or Tire Manufacturer will tell you we are an old and reputable clearing house. Our prices will astonish you. Write to-day for complete information to our Tourist Dept.

**The Rubber City
Clearing House Co.**
AKRON, OHIO.

(When Writing to Advertisers, Please Mention the Automobile Journal.)

ZENITH CARBURETOR



Acceleration

When you step on the accelerator of a Zenith-equipped car, the response is immediate—you get that instant response which stimulates your confidence and adds to your satisfaction.

The reason for this is clear when you comprehend the principle of Zenith operation. For no matter how fast or how slowly the fuel is fed to the cylinders, the Zenith Compound Nozzle insures the maintenance of the proper proportions of the gas and air under any and all conditions. The action is automatic—there are no adjustments to get out of order.

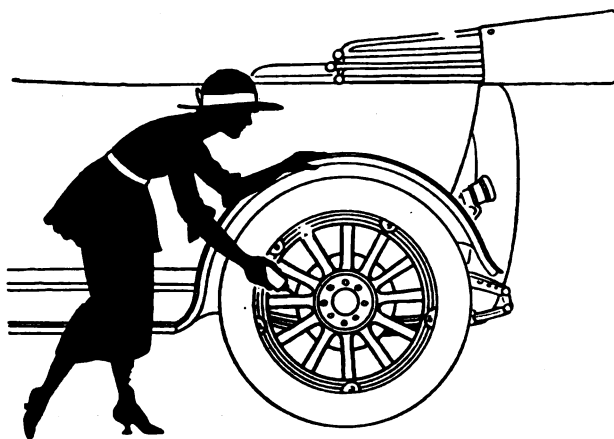
The experience of Zenith users is further supported by the fact that the world record for acceleration—one mile from a standing start in 38.83 seconds—was made in a Zenith-equipped car.

Try Zenith on your car or truck.

Zenith Carburetor Company
 New York DETROIT Chicago
 London Lyon Turin

Safety and Service Depends on Your Brakes

*Sold by Jobbers and Dealers
 Everywhere or Direct.
 Price \$1.00*



*Once Tried Always Used.
 An Article that Sells on Merit.
 Price \$1.00*

HOLDZFAST is a scientifically prepared liquid, sold in tin containers, and may be applied to either the external or internal brake lining, or to the frictioned facing of the multiple disc or cone type clutch, with equally good results. A few drops of HOLDZFAST will stop your brakes from squeaking, and increase the efficiency of your brakes at least 50%. Easily applied. Results guaranteed.

Representatives wanted in every city and town. Our proposition to the trade is liberal.

Manufactured only by

C. W. HOAGLAND CO., Inc.,

Room 1127,

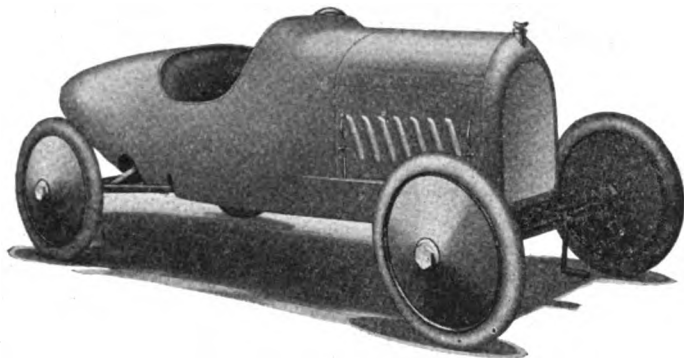
40 Court Street,

Boston, Mass.

(When Writing to Advertisers, Please Mention the Automobile Journal.)

SPEEDWAY BODIES FOR FORDS

AND UNDERSLUNG PARTS

**MORTON and BRETT**

Indianapolis, Ind.

PAIGE*The Most Beautiful Car in America*A complete line
of touring and
enclosed models.

Write for Literature.

Paige-Detroit Motor Car Co.

DETROIT, MICH.



50% additional wear built into your tires after they have reached the point when they are usually discarded. Save what otherwise would be wasted. This is a rebuilding plant operated by skilled workmen, the product of ten years experience building tires at the

Firestone and Goodrich factories.

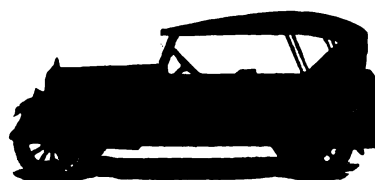
We absolutely guarantee from three to thirty-five hundred more miles after our work is finished.

Brown Retread Tire Company

70 Clarendon St. Boston

5 YEARS CONTRACTS

Write for territory and information on
passenger Cars and Trucks.
Separate contracts.

*Winther "Six"*
WINTER MOTOR SALES CORP.
KENOSHA, WIS.
GREB RIM TOOL

BEACHMATE, BEND.



"Wallop" your rim with a hammer to force it in or out of place and you are bound to have greater trouble next time.

DO THE SENSIBLE THING.

Provide yourself with the best rim tool on the market and save time, trouble and rims.

GREB RIM TOOL

You can quickly expand or contract any make of cross-split demountable rim—the Greb is universal and takes them all, especially the Kelsey.

TEN DAYS' TRIAL. If your dealer or jobber does not have them we will send you one. Try it for ten days. If not satisfactory, return it to us and we will refund your money.

THE GREB CO., 201 State Street, Boston 9, Mass.

The Accessory and Garage Journal

\$2 the Year, 20 Cents the Single Copy.

The only American publication devoted exclusively to the Power Vehicle and Allied Industries and Trades. A guaranteed circulation of 25,000 copies to trade interests only.

Address all communications to the

TIMES BUILDING

Pawtucket

Rhode Island

Two perfectly-timed sparks are delivered to each cylinder of the Dual Valve engine by the new ignition system. The gas is completely exploded—the full force delivered.

**PIERCE
ARROW****NEW DEPARTURE
BALL BEARINGS**

Strength
Stamina
Service



The New Departure Manufacturing Co., Bristol, Conn.
Conrad Patent Licensee

(When Writing to Advertisers, Please Mention the Automobile Journal.)

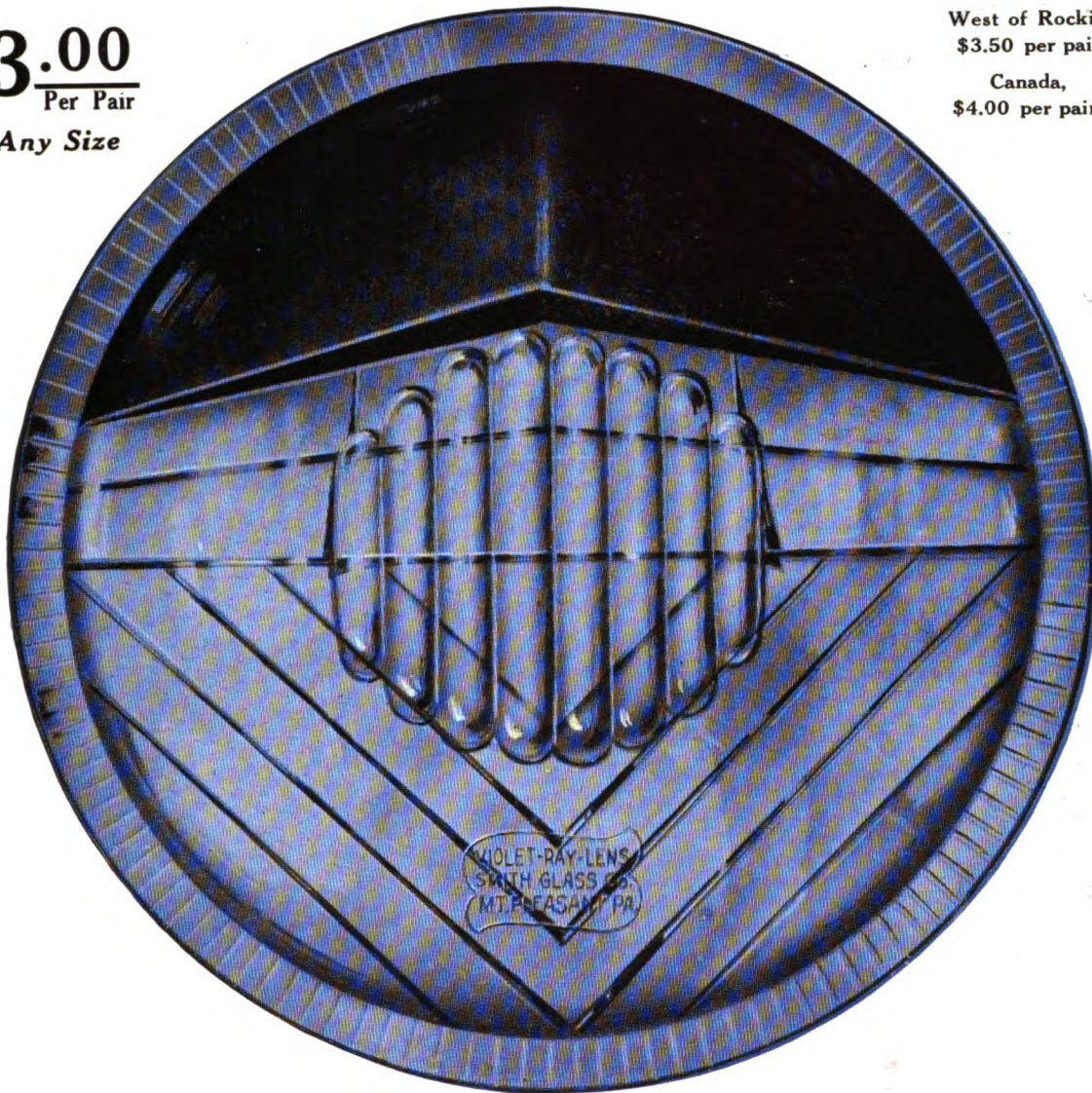
VIOLET RAY

AUTO LENS

LEGAL GLARELESS AND SAFE

\$3.00
Per Pair
Any Size

West of Rockies,
\$3.50 per pair
Canada,
\$4.00 per pair



The Blue Lens with Black Visor

The Violet Ray certainly will be the popular Lens in your territory this year. It will keep moving—and moving fast—because of its merits.

You can look this big light in the face without

batting an eye. Its blue glass absorbs all glare rays and its smart black visor prevents any upward shafts.

It gives a big white light on the road—the best you ever drove behind.

Write us for attractive proposition.

L. E. SMITH GLASS CO.

Mt. Pleasant, Pa.



ENDURANCE

A Tire That Gives Lasting Satisfaction

Unquestionably, the endurance qualities of India Tires are the basic reason for their sweeping popularity.

But, besides the quality of endurance, which means long and uninterrupted service, there is still another outstanding India feature—*appearance*. It is a fact that the handsome India Tires add to every car a note of distinction which is not available elsewhere.

This combination of rugged service with unusually attractive appearance means a lasting tire satisfaction that you can experience only with Indias.

For discriminating motorists, for motorists who want 100 per cent returns on their tire investment, India Tires are never disappointing.

The India Tire & Rubber Co.
Akron, Ohio

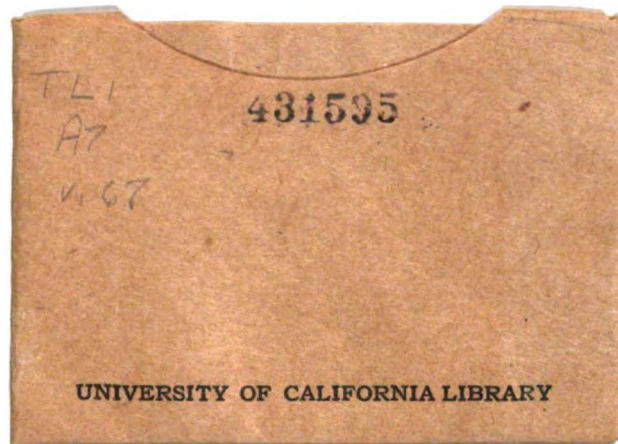
LIBRARY USE
RETURN TO DESK FROM WHICH BORROWED
MAIN LIBRARY
CIRCULATION DEPARTMENT
THIS BOOK IS DUE BEFORE CLOSING TIME
ON LAST DATE STAMPED BELOW

LIBRARY USE FEB 15 1975 9 9

~~LIBRARY USE~~

LD62A-80m-7,'78
(E227s10)9412-A-82

General Library
University of California
Berkeley



TL1

A7

v. 67

431595

UNIVERSITY OF CALIFORNIA LIBRARY

